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Railway Age

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Going Up and Up



1934

1935

1936

1937

1938

1939

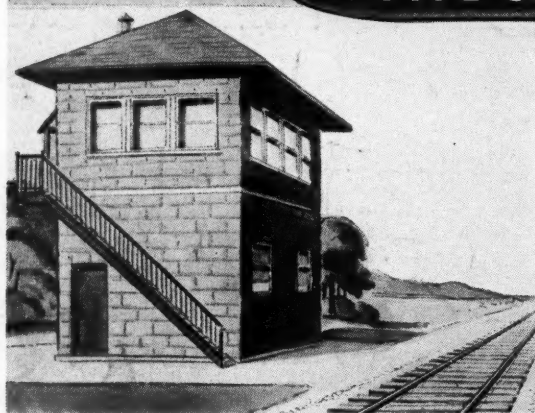
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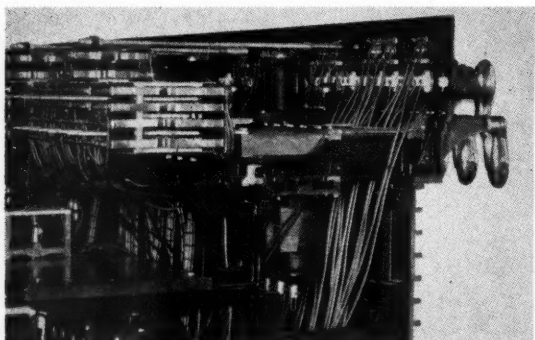
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RAILWAY AGE

What the Carloadings Show

The relative decline in freight traffic, which was rather sharp during January, has moderated considerably in the past few weeks, and it may be that it has about spent itself. The true situation is not revealed, of course, by the actual weekly carloadings' totals—but only by a comparison of the actual cars loaded with average loadings during similar weeks in other years. Such a comparison is made in the accompanying table and chart. Loadings for the first nine weeks of 1940 of miscellaneous freight, l. c. l. freight, coal and all other commodities are shown, in both the chart and table, in percentages of average loadings of these commodities in each of the first nine weeks of the years 1923-25. Preceding these ratios of recent weekly loadings there are given the annual loadings in each of the four commodity classifications, expressed in percentages of the average loadings of those commodities in the years 1923-25.

Has Business "Slow-Down" Ceased?

It will be noted that for the most recent three weeks for which information is available at this writing, there has been no decline whatever in the ratios of loadings of miscellaneous freight—the category generally accepted as the best measure of general business conditions. The "flattening out" of the rate of decline is particularly noticeable, when the ratios for the most recent four weeks are compared with those for the first four weeks in the year.

A similar "leveling off" in the traffic decline is to be noted in the ratios of less-than-carload traffic. This traffic was only a couple of points less in the most recent few weeks than it was in the first weeks of the year. The persistence of these loadings at these levels is all the more remarkable, because the loadings of less-than-carload traffic in recent weeks have, in absolute totals, been slightly less than they were in the same period of 1939—losses ascribable to the continued erosion of this traffic by truck competition. Coal loadings have been "up and down" in the past few weeks, but the downward tendency seems to have been arrested. Ratios of loadings of "all other" traffic have shown a tendency to rise in the four most recent weeks.

Definite conclusions cannot be drawn with any finality

from these figures. Nevertheless, when the up-turn in business was at its height late last fall, most observers of economic conditions predicted an "easing-up" in general business activity early in 1940, and this deceleration occurred right on schedule. These observers also expected that this "trough" would be moderate and of relatively short duration. These prognosticators may, of course, be wrong. But, if they are as correct in their estimation of the moderation of the decline as they were in forecasting it, the carloadings record seems to suggest that the slowing-up which they predicted may already be drawing to a close. The carloadings of the next few weeks will provide the answer. If the ratios to previous years' loadings do not dip further during the next few weeks, but, on the contrary, show a tendency to rise, such a development should be heartening in its bearing on the months which lie ahead.

Though there may thus be found occasion for moderate optimism as to the short-run outlook from the observation of carloading trends in recent weeks, there is so far little encouragement to be derived from the contemplation of the long-term trend of these loadings, as shown by the annual figures in the chart and table.

What Do Long-Term Trends Indicate?

Not one of the four important categories of rail traffic, shown in the table and chart, is holding up the way it should, to justify general optimism for the years that lie ahead. Miscellaneous traffic in recent years appears to be doing relatively better than the other categories—but this relatively better showing probably represents, to some extent, a transfer of freight from other classifications. (That is, for instance, miscellaneous freight has grown at the expense of l. c. l., with the diversion of such traffic from direct railroad handling to forwarder movement; and the shipment of refrigerated meat has to some degree supplanted the movement of live stock.) If the traffic thus diverted to miscellaneous were absent from this calculation, it is by no means certain that this class of traffic would make as relatively good a record as it has.

The next best relative showing, as the chart clearly indicates, has been made by coal—but coal is a commodity which, while it has not been diverted to com-

peting agencies of transportation to the same degree that other commodities have been, nevertheless is itself being subjected to ever-more-intensive competition

lower than those of a year ago, despite the great improvement in general business.

No Class of Traffic "Erosion Free"

Carloadings, by Commodities, Shown in Percentages of Average Loadings in Same Period 1923-25

	L. c. l. %	Misc. %	Coal %	All Other Com- modities %	Fed. Res. Index of Industrial Production*
1923	96	97	106	104	101
1924	99	97	95	97	95
1925	105	106	99	99	104
1926	105	109	111	100	108
1927	105	109	103	94	106
1928	104	112	98	94	111
1929	105	115	101	96	119
1930	97	99	88	77	96
1931	87	78	72	56	81
1932	72	55	59	38	64
1933	67	58	63	45	76
1934	65	64	68	48	79
1935	64	69	68	48	90
1936	66	82	77	61	105
1937	67	85	78	68	110
1938	61	68	62	50	86
1939	62	77	70	60	105
1940					
1st week	66	97	84	60	120
2nd week	65	92	79	55	
3rd week	64	86	78	52	
4th week	64	84	86	51	
5th week	64	86	82	54	109
6th week	64	83	75	51	
7th week	62	81	72	53	
8th week	60	79	78	53	
9th week	64	81	75	54	

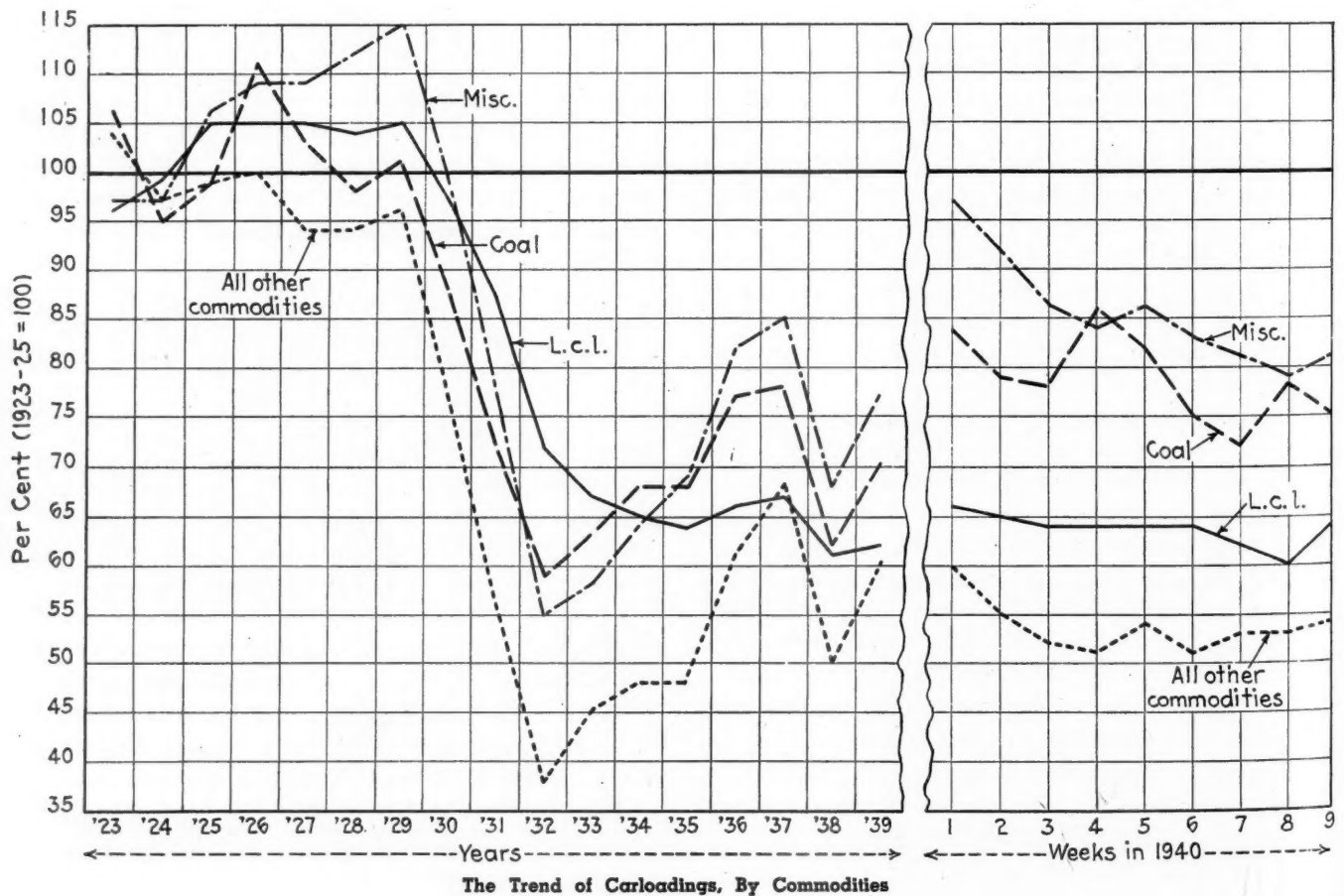
* Based upon 1923-25 = 100, as are the other percentage ratios in this table.

from piped and floated fuels and from tax-built hydro-electric power.

The situation with respect to l. c. l. traffic is perhaps best indicated by the fact that current loadings are

The "all other" category (including grain and its products, live stock, forest products, coke and ore) is, as the table and chart disclose, in the lowest relative position of all with respect to the years 1923-25. Much of this decline, of course, is ascribable to the really appalling loss of live stock traffic to the trucks; but there have also been great losses in forest products and in ore, not only by reason of diversion to competitors, but because of the failure of building and construction activities to show their normal growth.

There appear to be three separate schools of thought with regard to what the primary causes are for the railroads' loss of traffic. One of these ascribes the situation largely to subsidies and other favors enjoyed by competitors. Another sees the unfavorable general business situation as the primary cause. Those who hold this view recognize, of course, that a great deal of business has been taken by competitors, but they incline to the view that with a restoration of the normal rate of growth in national production, the railroads would not seriously miss their competitive losses and, furthermore, that the development of a "sellers' market" in transportation would provide less incentive than now exists for the further development of competition. A still further school of opinion places the primary re-



sponsibility for the erosion of railroad traffic on the time-honored freight rate structure. Adherents of this school believe that competitive losses by the railroads could be arrested—perhaps stopped altogether and even reversed—if the railroads would take full advantage of their superior economy to make rates which would prohibit less economical competitors from taking their business away.

This War Has Many "Fronts"

The *Railway Age* does not subscribe to any one of these three schools to the exclusion of the others. Evi-

dence currently presented in these pages demonstrates that there is plenty of truth in all three viewpoints. Like a modern war, the fight to hold and restore railroad traffic must proceed on many "fronts" simultaneously, viz. rate modernization; improved service to customers and greater economy of operation (including the use of new and improved equipment wherever it will save expense or secure business, and where the capital to obtain it with can be secured on reasonable terms); a pervasive and insistent educational campaign among the public to secure a termination of the railroads' competitive disadvantages; and the upholding of general economic and political principles which will

Mere "Price Fixing" Is Not Regulation

The demise of the Blue Eagle was not attended by lamentation on the part of believers in the American system of free enterprise. Least of all did they bewail the passing of N. R. A.'s effort to fix prices in some industries so high that inefficient producers could stay in business at the consumers' expense.

If memory serves, the trucking industry was one of those which strove to use the Blue Eagle to raise prices so that the least efficient could survive. A lot of nonsense was going on at the time, and one could overlook such a few months' binge in "planned economy"—but it looks like the truck boys have never got over the idea.

When an industry gangs up to boost prices, without any real consideration of costs of service, and with protection for the inefficient producer—and when the regulatory authorities condone such action—can it be said that regulation is serving the purpose for which it was created?

Do the kind of truck rates which we listed in this space last week reduce chaos in transportation, or do they not, rather, add to it? Do such rates promote efficient and economical transportation to the American people?

A. T. A. records show that inter-city motor transport has increased more than 50 per cent since regulation, without the nation's total traffic having increased—and the truck increase has come about very largely through "pick and choose" methods, accepted without protest by the railroads and approved by the Commission.

Practically all truck rates (except those on "back hauls") have been increased and the railroads have had to maintain "rail-bound" rates at levels higher than would be necessary if they had not lost so much traffic to the trucks. An inquiry worth making would be one to determine whether trucks, under present rate-making practices under which they get traffic to which they are not economically entitled, are really making any *net* contribution to cheaper and more efficient transportation.

If there is necessity for minimum rates to prevent rate wars, the Commission is not forced to accept arbitrary minimums. Why shouldn't it instead issue a "show cause" order, commanding the common and contract motor carriers and the rail-

roads to show why they should be permitted to make any rates on competitive traffic which return less than a certain amount per truck-mile or per train-mile — scheduling hearings simultaneously throughout the country and urging the State Commissions to take similar action with respect to intrastate rates?

It is claimed by some that it would be impractical to translate such bases into tariff form, but hasn't the Commission disproved such claims already by prescribing such bases in export and import cases? It should be comparatively simple to test rates and determine whether they provide the minimum per mile earnings set forth in the following table:

Minimum Earnings

Miles	Car Mile, C. L. (a) (cents)	Truck Mile, T. L. (b) (cents)	L. T. L. (c) (cents)
50 and less	56	32	76
50 to 100	32	24	46
100 to 200	20	20	31
200 to 300	17	19	26
300 to 400	15	18	23
400 to 500	14	18	22
500 to 600	13	17	21
600 to 700	12	17	20
700 to 800	12	17	20
800 to 900	11	17	19
900 to 1000	11	17	19

(a) Average cost, 20-ton box car loadings, I. C. C. Sta. 3681, less return on investment.

(b) 12 cents per mile, 4¢ cwt. terminal, 75% loaded, 20,000 lb. loadings.

(c) 12 cents per mile, 15¢ cwt. terminal, 75% loaded, 20,000 lb. loadings.

If it should be decided that all competitive traffic should yield some profit, then a uniform percentage could be added to these bases, or, the bases could be refined without difficulty, so more accurately to reflect the cost for each mileage block.

By such a device the Commission would place the burden upon the carriers to justify all of their competitive rates; and the fixing of all competitive rates on a basis of truly comparative economy would, in short order, cause the economic and efficient agencies to prevail and automatically eliminate the uneconomic and inefficient.

What other practical basis is there so sound and fair for prescribing minimum competitive rates? The Commission's minimum orders in Ex Parte M. C. 20, 21, 22 and 23, may have improved the revenues of some motor carriers, but not the general transportation situation.

How altered R.R. L.C.C.S.

promote the restoration of traffic-creating prosperity throughout the country.

No modern war can be won in the air alone, or on the sea alone, by military activity alone, or by a courageous and determined population alone. No more can the railroads put an end to traffic erosion by attacking it on one "front" only. The enemy must be dealt with wherever he is met. And traffic erosion has been waging unrelenting warfare on railroad well-being, not merely since 1929, but—as the chart herewith shows clearly—since as far back as 1925 and 1926.

Perfect Shipping

To better an already outstanding record in the reduction of loss and damage to railroad shipments—a record achieved through constant carefulness, protracted study and whole-hearted co-operation on the part of the railroads and their customers—April has been designated as Perfect Shipping Month. No more hopeful sign for the success of next month's campaign for perfect shipping and careful handling can be found than the mark set in the first eleven months of 1939 when, with an increase of 14 per cent in the volume of freight business as measured by revenues, there was a reduction of 13 per cent in the payments made for loss and damage to freight. As a result, the amount of each \$100 of railway freight revenues consumed by payments for freight loss and damage fell from 73 cents in 1938 to 56 cents in 1939.

The reduction in freight loss and damage payments made in the past year tells only part of the story, however. A somewhat longer view is needed to gage the total improvement which has been made. Payments for loss and damage to freight amounted to almost \$120,000,000 in 1920, to more than \$36,000,000 in 1930, and to less than \$19,000,000 in 1939, a reduction of 47 per cent below 1920, and a reduction of 84 per cent below 1920. Total loss and damage payments are affected, of course, by general price levels and by traffic volume, but, when this latter factor is eliminated, it appears that loss and damage payments per revenue car loaded have been cut from \$2.66 in 1920 and \$0.77 in 1930 to \$0.54 in 1939.

Each of the principal items of loss and damage to freight showed a reduction in 1939 as compared with 1938. These reductions amounted to 8 per cent in the case of concealed damage (where the shipment looks all right from the outside but not so good from the inside). Similarly, there were reductions of 15 per cent in damage caused by defective equipment and by improper handling; a reduction of 20 per cent in the loss or theft of entire packages; a reduction of 31 per cent in loss and damage caused by delay; and a reduction of 32 per cent in losses or thefts from packages or from commodities moving in bulk.

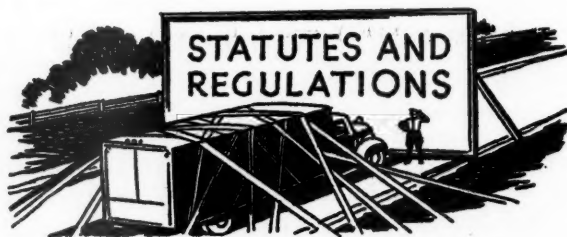
Of especial interest is the reduction that has been made in losses due to robbery or theft. These losses

amounted to almost \$13,000,000 in 1920 and to almost \$1,000,000 in 1930. In 1939 these theft losses amounted to \$420,000, an all-time low mark, equivalent to slightly more than one cent per loaded car. Thefts of cigarettes and liquor—articles of relatively high value, small bulk and readily disposable—have been eliminated almost entirely. A carload of cigarettes is worth \$60,000 and the volume of this traffic carried in a year is worth about \$700,000,000: theft losses thereon have been reduced to \$15,000 a year, or to about two one-thousandths of one per cent of total value. Hi-jacking of valuable consignments is rarely attempted, seldom succeeds. So efficient is railroad policing that convictions are obtained in 99 per cent of all cases tried.

The reductions in loss and damage to freight which have been made in the last two decades have saved the railroads substantial sums of money. But even more important has been their effect in emphasizing and re-emphasizing the efficiency and dependability of railroad service, and their contribution to the reputation of the railroads.

* * *

What's Wrong With This Picture?



From a Propaganda Pamphlet on "Barriers"
Issued by the American Trucking Associations

The most obvious thing that is wrong, of course, is that—according to A. T. A.'s own figures—truck traffic was 23 per cent higher in January, 1940, than it was in January, 1936. Railroad traffic, by contrast was only 5 per cent higher in January this year than in January, 1936.

From these figures it is evident that, if there were anything to this "barrier" ballyhoo, it is the railroads and not the trucks which are suffering from it.

The truckers claim immunity from highway fees and taxes in the states their vehicles invade. They deny the right of the states which thus play hosts to them to limit their sizes and weights. And they resent the host stopping his "star boarder" guests to see if they are obeying safety rules and regulations.

Add this campaign of the truckers for further special privileges to the efforts of a lot of Washington bureaucrats to sabotage states rights—and you have 90 per cent of this "barrier" campaign in a nutshell. The other 10 per cent consist of real obstacles to interstate trade which, however, need no ballyhoo to remove them, but simply the honest enforcement of existing law.

President Wants S. 2009 Enacted

Favors I. C. C. regulation of water carriers despite views of two cabinet members and Maritime Commission chairman

WASHINGTON, D. C.

SPURRED on by President Roosevelt's expressed hope that the bill with its water-carrier provisions would be enacted at this session, despite objections of two members of his cabinet and the chairman of the United States Maritime Commission, conferees on S. 2009 pressed forward this week with a view to framing a conference report and having it adopted in both houses of Congress by the first of April. Chairman Wheeler of the Senate committee on interstate commerce, spokesman for the conferees, indicated on March 8 that he expected the detailed work of going over the bill and perfecting the language to be completed by the end of this week, after which the conferees will return to various controversial matters passed over, such as the through-routes provisions, the Harrington "labor-protection" amendment and the Miller-Wadsworth amendment.

The Roosevelt pronouncement on the bill came at the President's March 8 press conference when he was asked about a talk he had had on the previous day with Chairman Wheeler. As Senator Wheeler had already revealed, the President said that the talk had been about S. 2009, adding that he had told Senator Wheeler that he hoped very much that the conferees would agree and put through a bill at this session. Asked if he had anything to say about the regulation of water carriers by the Interstate Commerce Commission, President Roosevelt replied that if the questioner would check his previous utterances on the subject he would find that they called for consolidation of government regulation of all agencies of transportation. The President added that S. 2009's enactment would comprise a step toward that end.

Repudiates Woodring-Wallace-Land Views

It was when he was asked if Senator Wheeler had said what was holding up a conference report that Mr. Roosevelt referred to the joint letter sent to Chairman Bailey of the Senate committee on commerce by Secretary of Agriculture Wallace, Secretary of War Woodring and Chairman Land of the Maritime Commission. (See *Railway Age* of March 2, page 413.) That letter, the President went on, was written while he was away; and he had not heard of it until Senator Wheeler brought it in on the previous day. Mr. Roosevelt added that he had told the Senator that he thought the points of view of the Woodring-Wallace-Land letter related primarily to the authority of the individual departments which the authors head; and that the greater good for the greater number should control over the immediate interests of the War and Agricultural departments and the Maritime Commission. The discussion closed with the President's affirmative answer to a question as to whether Senator Wheeler agreed with the foregoing.

Senator Wheeler is understood to have asked for his March 7 appointment with the President; as he left the White House he said that the bill had the Presidential endorsement and would pass despite the opposition of Secretaries Wallace and Woodring who "didn't know what they were talking about." The Senator did not

mention the other member of the joint-letter triumvirate—Admiral Land, the Maritime Commission chairman.

"In the first place," Chairman Wheeler said, "Secretary Wallace and Secretary Woodring don't know what is in the bill. They don't know what will be in the bill when it comes out of conference and they don't know anything about the legislation." After next predicting that probably none of the transportation agencies would support all provisions in the bill which the conference committee reports, the Montanan continued as follows:

"We are doing everything in this legislation to protect and safeguard water carriers and what we are doing is to put the regulation of them under the Interstate Commerce Commission. That does not mean, nor should it mean, that their rates should be raised to the level of railroad rates because we have provided specifically that inherent advantages of each form of transportation should be taken into consideration by the commission in fixing rates.

Wheeler on "Railroad-Minded" I. C. C.

"The water carriers have said that they are afraid of the I. C. C. because the commission is railroad minded. The bus and truck people said the same thing at one time but they have been under the commission for six or seven years and there is no complaint that the commission has treated them unfairly or sought to put them out of business for the railroads. On the other hand, the railroads have complained that the I. C. C. leans over backwards too far for the buses and trucks."

Responding to questions, Senator Wheeler said he was opposed to sale of the government-owned Inland Waterways Corporation to private interests, adding that this would not be done if he could prevent it. He also referred to the opposition of the Union Pacific and Pennsylvania to the through-routes provisions which are in the Senate version; and to controversies over "the bill's consolidation provisions" and over "a great many other provisions." He added that "we are working it out gradually and everything is being done to protect the water carriers, and we actually are leaning over backwards to safeguard them in the bill."

As noted above it was on the day of the President's statement that the conferees revealed their plan to complete Congressional action on the bill by the first of next month. It is understood in this connection that the conferees are passing upon the detailed provisions as rapidly as the "experts" from the staffs of the I. C. C. and Maritime commission can whip material into shape for their consideration. Also, there is considerable comment on the harmonious and cooperative character of the conference-committee meetings. Conferees, who are Capitol Hill veterans, have been heard to say that they recall no conference-committee work in their previous experience where there was less dispute and bickering between Senate and House representatives.

Prospects for including provisions for the regulation of forwarders are still being discussed, although leading members of the Senate-conferee group appear to be

persisting in their view that the matter should await the investigation called for in Senate Resolution 146 and that meanwhile no attempt should be made to incorporate the new Part IV, drafted by Chairman Eastman of the I. C. C. for that purpose. Moreover there is said to be more or less general agreement among both Senate and House conferees that the House bill's proposal to regulate forwarders merely by adding them to the list of common carriers subject to Part I would be inadequate. The Eastman draft of proposed provisions to regulate forwarders (outlined in last week's issue, page 454) brought forth a March 7 statement from the Freight Consolidators & Forwarders Institute. The statement said:

Forwarders Want Regulation

"The legislative committee of the Freight Consolidators & Forwarders Institute have been busily engaged in analyzing the draft proposed by Mr. Eastman of a new Part IV to regulate the freight forwarding industry under the Interstate Commerce Commission. While this proposed legislation in its entirety is considered severe, with only a few but very important exceptions (which are noted by Mr. Eastman in his letter of transmittal as being controversial) the industry feels it could go along with the proposal if amended. Efforts are now being made to amend these particular sections."

A new line of attack in his save-the-Harrington-amendment campaign was launched on March 9 by President A. F. Whitney of the Brotherhood of Railroad Trainmen who on that day sent a letter to members of the House, assailing railroad financial policies of the past and calling for enactment of S. 1869, the Senate-approved bill providing for a special court to handle railroad reorganizations. That bill, which is now pending before the House committee on judiciary, Mr. Whitney said, "gives the Congress an opportunity to put first things first, by solving the real problem—an intelligent method of reorganizing bankrupt railroads." At the same time the B. of R. T. president urged the Congressmen "to defeat S. 2009 . . . unless the Harrington amendment is retained."

Mr. Whitney's letter opened by recalling how the author had previously called to Congress' attention "the fact that enactment of the omnibus transportation bill, S. 2009, without the Harrington amendment, would result in railroad bankers launching a nationwide railroad consolidation program which would create many ghost communities, seriously injure business, destroy at least a quarter of a million jobs of railroad workers, and by eliminating those farthest from receiving benefits under the Railroad Retirement Act without correspondingly reducing the number entitled to receive benefits under that act, would greatly increase the age level and threaten the solvency of the Railroad Retirement Act." Mr. Whitney went on to talk about the unemployment problem, in view of which he was "certain that the overwhelming majority of the members of Congress agree with us that S. 2009 should not become a law, unless the Harrington amendment, which protects jobs from the slaughter of banker-inspired consolidations, is retained."

Other quotations from the Whitney letter are: "The railroad industry must be saved from the railroad bankers;" "a solution of the problems of the railroad industry must begin with a correct diagnosis of the disease—the smallpox of banker control and financial manipulation;" and "for 100 years we have witnessed the bad business of reorganizing railroads, only to have them re-

turn to receiverships in a comparatively short period of time."

May Keep Present Consolidation Provisions

Meanwhile, the Harrington amendment's sponsor—Representative Harrington, Democrat of Iowa—has continued to gather signatures of his colleagues on his petition calling upon the conferees either to retain the amendment unchanged or report a disagreement on it so the provision will come up for a separate vote. About 275 had signed up to Wednesday of this week, although Mr. Harrington had not up to that time presented the petition to the conference committee. He had, however, written to the conferees, advising them that he had the petition. The furor over the Harrington amendment is bringing more and more talk to the effect that the conferees may avoid the issue by leaving the consolidation provisions as they are in the present law. This, of course, would leave the requirement that consolidations be in harmony with the plan promulgated by the I. C. C.; but that is not regarded generally as a major obstacle to the consummation of desirable mergers. As the commission said in its annual report it did not think the change in the consolidation provisions contemplated by S. 2009 "will be very fruitful of results." It followed through on that statement by pointing out how it has been disposed to modify the present consolidation plan to permit specific unifications.

Communications from retired railroad employees who have taken opposite positions on the bill were printed in appendices to recent issues of the Congressional Record. In the March 6 issue Representative Harrington extended his remarks to include a letter from W. C. Patrick of the Association of Retired Railway Employees who expressed concern for his pension if the bill should pass without the Harrington amendment. In the March 12 issue of the Record Representative Van Zandt, Republican of Pennsylvania, inserted a copy of a resolution favoring the bill which had been adopted by the International Railway Association, having "a membership of 637 retired men."

Mr. Harrington also inserted in the March 7 issue a resolution wherein the Nebraska State Farmers' Union had gone on record in opposition to the bill's water-carrier provisions.

* * *



These Paper-Handle Cups Are the Product of the Sutherland Paper Company, Kalamazoo, Mich.—The Handles Are an Integral Part of the Cups, Which Are Suitable for Dispensing Hot Liquids



Double-Sheathed Alloy-Steel Box Car of 50 Tons Capacity, Built by the Magor Car Corporation

Delaware, Lackawanna & Western Lightweight Box Cars

A. A. R. 50-ton cars, embodying the use of USS Cor-Ten steel, weigh 44,000 lb., light, and have a load limit of 169,000 lb.

IN November, 1939, the Delaware, Lackawanna & Western placed an order with the Magor Car Corporation, New York, for 500 double-sheathed steel box cars of 50 tons capacity which are now being completed at the Passaic, N. J., plant of that builder, 280 of the cars having been delivered and placed in service. These cars are designed for the handling of high-class commodities such as grain. Each car has a cubic capacity of 3,712 cu. ft. and through the extensive use of USS Cor-Ten and Man-Ten steel in the various members of the underframe and superstructure, a car having a light weight of 44,000 lb. and a load limit of 125,000 lb. has been produced. The ratio of pay load to gross load is 74.0 per cent.

Underframe Construction

The center sills consist of two A. A. R. Z-shaped standard sections weighing 36.21 lb. per ft. These center-sill members are spaced 12 $\frac{3}{8}$ in. between the webs and extend the full length of the car from buffer to buffer. The center sill spacers, six in number, are Cor-Ten pressings. The top center-sill flanges are joined by welding, the welded seam running the entire length of the sills.

The side sills are 6-in. by 3 $\frac{1}{2}$ -in. by $\frac{1}{4}$ -in. Cor-Ten angles, in one piece, and extend the full length of the car. They are reinforced at the center of the car and at the bolster positions. The end sills are Cor-Ten angles of the same dimensions as the side sills and extend the full width of the car. The body bolsters are of the built-up type, each one consisting of four pressed Cor-Ten diaphragms, $\frac{3}{16}$ in. thick spaced 12 in. apart. The bol-

Principal Weights and Dimensions of D. L. & W. Box Cars

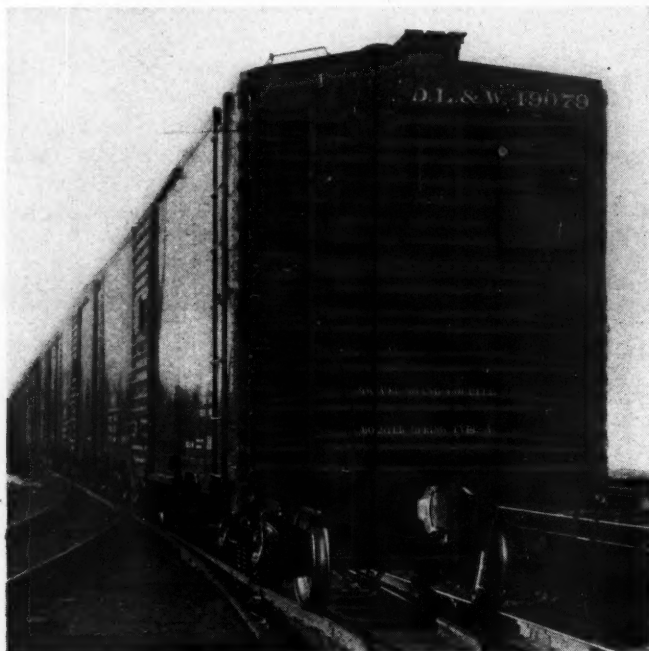
Length inside of body, ft.-in.	40- 6
Width inside of body, ft.-in.	9- 2
Height from floor to roof at inside, width, ft.-in.	10- 0
Width of side-door opening, ft.-in.	6- 0
Height of side-door opening, ft.-in.	9- 4 $\frac{11}{16}$
Length over striking plates, ft.-in.	41- 8 $\frac{1}{2}$
Length center to center of trucks, ft.-in.	30- 8 $\frac{1}{2}$
Width of car over side sills, ft.-in.	9- 9 $\frac{3}{8}$
Width over side plates, ft.-in.	9-10 $\frac{3}{8}$
Cubical capacity, cu. ft.	3,712
Weight capacity, nominal, lb.	100,000
Pay load limit, lb.	125,000
Light weight, lb.	44,000
Ratio of pay load to gross load, per cent	74.0

ster cover plates, both top and bottom, are $\frac{5}{16}$ in. by 21 in. Man-Ten extending from side sill to side sill. The cross-bearers are built up of $\frac{3}{16}$ -in. pressed Cor-Ten

diaphragms with $\frac{1}{4}$ -in. by 8-in. Man-Ten top and bottom cover plates. The crossies, four on each side of the car, are made of $\frac{1}{8}$ -in. Cor-Ten steel extending from the center sill to the side sills with the top flange arranged to support 3-in., 5.1-lb. Cor-Ten Z-bars which in turn support the car floor. The floor-support diaphragm connections and diagonal corner braces are $\frac{3}{16}$ -in. Cor-Ten pressed members.

The Superstructure

There are 16 side posts consisting of A. A. R. 3-in., 5.1-lb. rolled Z bars. These are riveted to the side sills and the bottom flange of the side plate. This latter member is an A. A. R. W-section weighing 9.83 lb. and ex-



The Dreadnaught Ends Have Flanged Rounded Corners—The Trucks Are the Spring-Plankless Type with Chilled Iron Wheels Having Ground Treads

tending in one piece the full length of the car. The door posts are 4-in. by 3-in. by $\frac{3}{16}$ -in. Cor-Ten angles riveted to the side sills and side plates in the same manner as the side posts, except that they are reinforced at the top and bottom side members with $\frac{3}{16}$ -in. gusset plates. The corners of the car are closed at the side plates with $\frac{1}{8}$ -in. Cor-Ten pressed caps.

The side sheathing is $\frac{1}{16}$ -in. Cor-Ten sheet extending in one-piece panels from side sill to side plate with lap joints at all side posts. The joints are waterproofed and the sheathing is riveted to the framing. The car ends are the Union Metal Products Company's Dreadnaught steel ends, made in two sections. The upper sections of these ends are $\frac{3}{16}$ in. thick and the lower sections $\frac{1}{4}$ in. thick. The upper edges of the car ends are flanged to conform to the roof contour and form the body end plates. The sides of the steel ends are flanged to form a rounded car corner which, in turn, forms the corner-post covering. The side flange joints are welded.

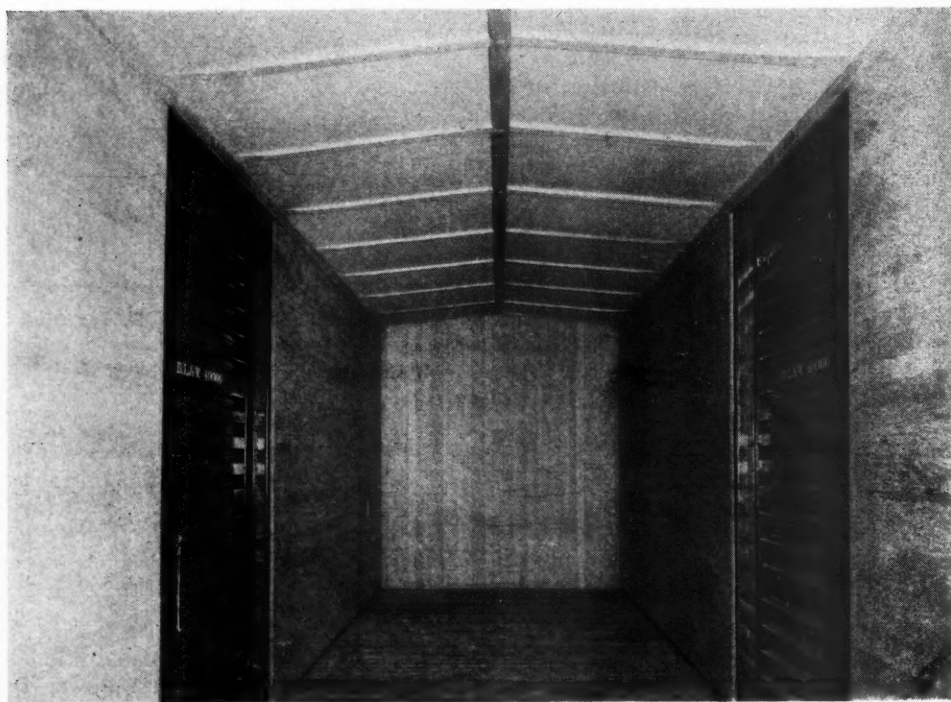
The cars are equipped with Youngstown steel doors and Camel roller lift fixtures. All openings around the doors and fixtures are welded. The threshold plates are $\frac{1}{8}$ -in. pressed Cor-Ten members extending from door post to door post and attached to the side sills with $\frac{1}{4}$ -in. countersunk bolts.

The car roof is a Standard Railway Equipment Manufacturing Company's Murphy improved galvanized copper-bearing-steel roof of No. 15 gage with running-board saddles of the same material $\frac{1}{8}$ in. thick. The running boards are wood and are applied in three lengths.

The side and end linings of the cars are $1\frac{3}{16}$ -in. tongue-and-groove Douglas fir dressed to $3\frac{1}{4}$ -in. face. In the side lining each board is in one piece extending from the door post cap to the steel end. The lining boards are placed $1\frac{1}{2}$ in. from the top of the floor and extend to the ceiling so that no metal is exposed inside the car at the side plates. The end lining is nailed vertically to six 3-in. by 3-in. wood fillers bolted into corrugations of the steel ends. The interior of the car is ceiled with $\frac{1}{4}$ -in. plywood applied crosswise of the car in two panels extending from side plate to ridge pole and spliced at each carline.

The flooring is tongue-and-groove southern yellow

(Continued on page 493)



The Interior of the Car Is Completely Lined With Douglas Fir Side and End Planking, Pine Flooring and Plywood Ceiling—The Door Openings Are Six Feet Wide

1939's Net Income Was \$94,638,951

WASHINGTON, D. C.

THE Interstate Commerce Commission on March 8 made public its compilation of selected income and balance sheet items for December and the 12 months of 1939, showing last year's net income of the Class I roads to have been \$94,638,951, as previously reported

by the Association of American Railroads and noted in the *Railway Age* of March 2. This compares with a net deficit of \$121,348,707 for 1938.

Seventy-two Class I roads reported net incomes for 1939 while 56 reported deficits, as compared respectively with 54 net incomes and 74 deficits in 1938. Last year's net railway operating income was \$588,787,173, as compared with 1938's \$373,150,637; fixed charges were up from \$612,331,738 to \$617,403,207.

The commission's summary and the principal items for the individual roads are given in accompanying tables.

Selected Income and Balance-Sheet Items of Class I Steam Railways

Compiled from 133 Reports (Form IBS) Representing 138 Steam Railways

(Switching and Terminal Companies Not Included)

TOTALS FOR THE UNITED STATES (ALL REGIONS)

For the month of December 1939 1938	Income Items	For the twelve months of 1939 1938	Selected Asset Items	Balance at end of December 1939 1938
\$60,939,404 \$49,418,861	1. Net railway operating income..	\$588,787,173 \$373,150,637	13. Investments in stocks, bonds, etc., other than those of affiliated companies (Total, Account 707)	\$623,312,756 \$647,045,592
32,321,973 28,559,320	2. Other income..	160,811,667 155,026,160	14. Cash	\$529,489,081 \$449,799,717
93,261,377 77,978,181	3. Total income..	749,598,840 528,176,797	15. Demand loans and deposits	21,727,848 11,251,587
3,671,157 2,866,389	4. Miscellaneous deductions from income	25,052,010 24,657,534	16. Time drafts and deposits	27,141,993 19,492,964
89,590,220 75,111,792	5. Income available for fixed charges	724,546,830 503,519,263	17. Special deposits	103,659,785 65,053,260
12,786,238 11,924,361	6. Fixed charges:		18. Loans and bills receivable	2,795,692 1,157,529
38,685,315 39,396,203	6-01. Rent for leased roads and equipment	142,099,580 134,658,582	19. Traffic and car-service balances receivable	66,656,515 61,063,826
141,586 *96,404	6-02. Interest deductions	†473,703,080 †475,435,269	20. Net balance receivable from agents and conductors	51,714,123 41,333,648
51,613,139 51,224,160	6-03. Other deductions	1,600,547 2,237,887	21. Miscellaneous accounts receivable	136,234,835 128,092,836
37,977,081 23,887,632	6-04. Total fixed charges..	617,403,207 612,331,738	22. Materials and supplies	327,235,877 317,569,080
1,354,830 1,392,523	7. Income after fixed charges..	107,143,623 *108,812,475	23. Interest and dividends receivable	18,704,690 20,145,284
36,622,251 22,495,109	8. Contingent charges	12,504,672 12,536,232	24. Rents receivable	1,342,045 1,301,049
16,705,057 16,564,857	9. Net income†.	94,638,951 *121,348,707	25. Other current assets	4,199,777 3,204,774
2,926,744 2,725,324	10. Depreciation (Way and structures and Equipment) ...	201,866,190 201,824,376	26. Total current assets (items 14 to 25) ..	\$1,290,902,261 \$1,119,465,554
18,980,463 7,142,753	11. Federal income taxes	33,037,024 18,928,207	Selected Liability Items	
639,633 937,697	12. Dividend appropriations:		27. Funded debt maturing within 6 months§	\$114,476,555 \$184,553,535
	12-01. On common stock ...	106,664,624 69,088,936	28. Loans and bills payable¶	\$231,515,578 \$243,624,529
	12-02. On preferred stock..	19,154,336 13,643,635	29. Traffic and car-service balances payable ..	84,400,471 77,409,499
			30. Audited accounts and wages payable ...	221,756,601 204,622,374
			31. Miscellaneous accounts payable	68,324,103 73,894,587
			32. Interest matured unpaid	970,480,801 833,417,521
			33. Dividends matured unpaid	11,315,819 9,759,377
			34. Funded debt matured unpaid	811,063,760 629,158,053
			35. Unmatured dividends declared	4,111,783 2,249,748
			36. Unmatured interest accrued	77,108,732 81,390,532
			37. Unmatured rents accrued	16,523,247 16,891,480
			38. Other current liabilities	31,903,810 27,622,808
			39. Total current liabilities (items 28 to 38)	\$2,528,504,705 \$2,200,040,508
			40. Tax liability (Account 771):	
			40-01. U. S. Government taxes	\$81,286,750 \$54,182,771
			40-02. Other than U. S. Government taxes	128,057,086 139,175,671

* Deficit or other reverse items.

† Represents accruals, including the amount in default.

‡ For 99 railways not in receivership or trusteeship the net income or deficit was as follows: December, 1939, \$40,946,029; December, 1938, \$29,914,082; 12 months, 1939, \$194,620,985; 12 months, 1938, \$31,544,598.

§ Includes payments which will become due on account of principal of long-term debt (other than that in Account 764, Funded debt matured unpaid) within six months after close of month of report.

¶ Includes obligations which mature not more than 2 years after date of issue.

Selected Income Items by Regions and Districts, Class I Steam Railways, Calendar Years 1939 and 1938

Region and Railway	Net Railway Operating Income		Total Income		Total Deductions		Net Income	
	1939	1938	1939	1938	1939	1938	1939	1938
Eastern District:								
New England Region	\$19,323,461	\$3,019,623	\$26,063,616	\$9,531,620	\$28,440,145	\$28,969,021	*\$2,376,529	*\$19,437,401
Great Lakes Region	94,776,974	40,945,838	119,796,741	62,445,634	112,246,103	114,188,782	7,550,638	*51,743,148
Central Eastern Region	138,818,135	92,217,861	187,698,452	140,580,818	147,657,225	148,290,121	40,041,227	*7,709,303
Total, Eastern District	252,918,570	136,183,322	333,558,809	212,558,072	288,343,473	291,447,924	45,215,336	*78,889,852
Southern District:								
Pochohontas Region	78,256,775	59,219,739	81,947,409	63,162,034	16,169,449	15,852,493	65,777,960	47,309,541
Southern Region	79,592,775	60,204,024	94,323,844	72,481,053	82,656,033	82,215,500	11,667,811	*9,734,447
Total, Southern District	157,849,550	119,423,763	176,271,253	135,643,087	98,825,482	98,067,993	77,445,771	37,575,094
Western District:								
Northwestern Region	59,516,955	28,693,820	72,816,519	40,840,226	92,956,727	91,946,956	*20,140,208	*51,106,730
Central Western Region	87,020,758	64,730,864	131,417,575	111,658,331	111,419,102	104,244,506	19,998,473	7,413,825
Southwestern Region	31,481,340	24,118,868	35,534,684	27,477,081	63,415,105	63,818,125	*27,880,421	*36,341,044
Total, Western District	178,019,053	117,543,552	239,768,778	179,975,638	267,790,934	260,009,587	*28,022,156	*80,033,949
United States	588,787,173	373,150,637	749,598,840	528,176,797	654,959,889	649,525,504	94,638,951	*121,348,707
Akron, Canton & Youngstown Ry.†	306,009	81,567	409,634	172,992	427,376	252,882	*17,742	*79,890
Atchison, Topeka & Santa Fe Ry.†	19,170,866	18,026,118	22,056,289	21,876,365	13,553,557	13,648,321	8,502,732	8,228,044
Atlantic Coast Line System:								
Atlanta & West Point R. R.	*18,900	*105,820	2,439	*78,754	6,335	5,532	*3,896	*84,286
Atlanta, Birmingham & Coast R. R.	*125,511	*192,268	*87,284	*156,260	15,209	17,539	*102,493	*173,799
Atlantic Coast Line R. R.	3,781,872	2,390,751	8,133,095	5,640,327	7,329,021	7,498,777	804,074	*1,858,450
Charleston & Western Carolina Ry.	453,711	291,986	477,586	316,135	303,569	302,424	174,017	13,711

* Deficit or other reverse items.

† Report of trustee or trustees.

‡ Includes Atchison, Topeka & Santa Fe Ry., Gulf, Colorado & Santa Fe Ry., and Panhandle & Santa Fe Ry.

Selected Income Items by Regions and Districts, Class I Steam Railways, 1939 and 1938—Continued

Region and Railway	Net Railway Operating Income		Total Income		Total Deductions		Net Income	
	1939	1938	1939	1938	1939	1938	1939	1938
Atlantic Coast Line System:—(cont'd)								
Clinchfield R. R.	\$3,286,120	\$2,237,387	\$3,297,515	\$2,668,759	\$3,297,515	\$2,668,759	.....	.....
Georgia R. R.—Lessee Organization	700,627	523,737	726,853	561,509	667,851	667,965	\$59,002	*\$106,456
Louisville & Nashville R. R.	15,848,660	11,622,971	16,962,791	12,500,358	9,568,560	9,794,342	7,394,231	2,706,016
Nashville, Chattanooga & St. Louis Ry.	1,982,653	1,481,936	2,174,170	1,696,705	1,555,502	1,554,410	618,668	142,295
Western Ry. of Alabama	136,880	86,791	178,461	130,909	74,801	76,161	103,660	54,748
Baltimore & Ohio System:								
Alton R. R.	920,648	312,863	1,005,084	392,408	1,915,992	1,839,975	*910,908	*1,447,567
Baltimore & Ohio R. R.	25,525,100	14,851,794	32,000,020	21,346,623	33,622,227	34,471,153	*1,622,207	*13,124,530
Staten Island Rapid Transit Ry.	*239,503	*271,947	587,391	573,060	587,391	573,060	.....	.....
Bangor & Aroostook R. R.	945,739	974,778	1,007,469	1,018,664	791,848	779,695	215,621	238,969
Bessemer & Lake Erie R. R.	5,167,327	2,270,644	5,315,420	2,394,952	1,538,264	1,579,762	3,777,156	815,190
Boston & Maine R. R.	6,955,142	1,254,166	8,152,463	2,431,420	7,444,581	7,531,046	707,882	*5,099,626
Burlington-Rock Island R. R.	355	*44,746	2,763	*41,929	787,192	796,002	*784,429	*837,931
Burlington Route:								
Chicago, Burlington & Quincy R. R.	12,270,452	12,407,392	13,405,417	13,503,209	9,744,078	9,861,446	3,661,339	3,641,763
Colorado & Southern Ry.	488,241	102,510	1,777,256	1,573,623	2,053,321	2,026,989	*276,065	*453,366
Fort Worth & Denver City Ry.	803,230	907,108	825,826	947,817	1,051,727	1,068,326	*225,901	*120,509
Cambria & Indiana R. R.	912,535	865,821	926,572	879,545	89,057	100,788	837,515	778,757
Canadian National System:								
Canadian National Lines in New England	*626,911	*629,455	615,524	629,915	591,056	623,512	24,468	6,403
Central Vermont Ry.	420,693	*545,204	458,600	*507,743	1,236,973	1,255,540	*778,373	*1,763,283
Duluth, Winnipeg & Pacific Ry.	*51,499	*294,672	511,923	486,928	474,110	476,014	37,813	10,914
Grand Trunk Western R. R.	1,609,123	*788,981	2,297,050	*268,130	4,634,038	4,633,323	*2,336,988	*4,901,453
Canadian Pacific System:								
Canadian Pacific Lines in Vermont	*583,681	*715,273	264,000	264,000	264,000	264,000	.....	.....
Duluth, South Shore & Atlantic Ry.†	83,087	*126,865	97,544	*109,995	942,578	967,422	*845,034	*1,077,417
International Ry. Co. of Maine	114,760	17,731	120,899	117,680	120,899	117,680	.....	.....
Minneapolis, St. Paul & Sault Ste. Marie Ry.†	2,826,813	*224,884	2,983,072	*44,169	8,615,457	6,594,141	*5,632,385	*6,638,310
Spokane International Ry.†	96,238	56,461	109,254	68,812	275,348	275,033	*166,094	*206,221
Chesapeake & Ohio System:								
Chesapeake & Ohio Ry.	36,354,138	28,983,311	37,005,057	29,952,550	9,662,346	9,269,717	27,342,711	20,682,833
Erie R. R. (inc. Chicago & Erie R. R.)‡	11,464,135	3,214,328	12,585,002	4,223,405	14,034,523	15,001,199	*1,449,521	*10,777,794
New York, Susquehanna & Western R. R.†	264,337	48,827	338,706	113,572	654,631	659,343	*315,925	*545,771
New York, Chicago & St. Louis R. R.	8,437,279	5,058,132	10,548,397	6,205,657	7,177,195	7,265,161	3,371,202	*1,059,504
Chicago & Eastern Illinois Ry.†	1,022,073	667,265	1,359,524	915,069	2,478,716	2,302,719	*1,119,192	*1,387,650
Chicago & Illinois Midland Ry.	924,597	591,158	932,687	597,314	372,880	461,293	461,293	224,434
Chicago & North Western System:								
Chicago & North Western Ry.†	5,722,260	*125,511	7,495,288	1,472,059	16,605,156	16,748,042	*9,109,868	*15,275,983
Chicago, St. Paul, Minneapolis & Omaha Ry.	313,556	*244,587	381,577	*176,776	2,486,725	2,497,592	*2,105,148	*2,674,368
Chicago Great Western R. R.†	1,779,771	593,476	1,898,240	723,636	1,960,388	1,867,909	*62,148	*1,144,273
Chicago, Indianapolis & Louisville Ry.†	404,425	*414,285	490,072	*327,053	1,551,119	1,523,967	*1,061,047	*1,851,020
Chicago, Milwaukee, St. Paul & Pacific R. R.†	8,124,194	5,274,539	9,556,094	6,203,350	23,983,477	24,199,620	*14,427,383	*17,996,270
Chicago, Rock Island & Pacific Ry.†	5,458,853	2,512,843	5,999,181	3,061,081	14,336,727	14,452,701	*8,337,546	*11,391,620
Columbus & Greenville Ry.	92,599	125,786	111,749	144,767	11,766	15,105	99,983	129,662
Delaware & Hudson R. R.	5,519,101	3,532,502	5,696,134	3,752,899	4,103,111	3,909,104	1,593,023	*156,205
Delaware, Lackawanna & Western R. R.	6,028,688	2,509,621	7,378,541	3,797,587	7,887,526	7,752,541	*508,985	*3,954,954
Denver & Rio Grande Western R. R.†	1,666,116	171,129	2,164,774	479,295	6,122,103	6,139,402	*3,957,329	*5,660,107
Denver & Salt Lake Ry.	800,866	877,224	808,678	887,275	806,858	886,429	1,820	846
Detroit & Mackinac Ry.	130,876	156,722	135,328	160,055	119,247	120,301	16,081	39,754
Detroit & Toledo Shore Line R. R.	624,927	358,358	647,261	377,516	132,614	120,800	514,647	256,716
Detroit, Toledo & Ironton R. R.	1,991,456	1,176,310	2,028,436	1,213,523	801,879	833,831	1,226,557	379,692
Duluth, Missabe & Iron Range Ry.	7,288,646	1,553,381	7,626,988	1,863,529	1,102,919	1,406,266	6,524,069	457,263
Elgin, Joliet & Eastern Ry.	3,315,466	1,160,868	3,493,903	1,238,253	996,854	966,121	2,497,049	272,132
Florida East Coast Ry.†	743,699	1,029,492	834,667	1,117,380	2,925,699	3,082,906	*2,091,032	*1,965,526
Frisco Lines:								
St. Louis-San Francisco Ry.†	3,886,751	1,192,550	4,035,817	1,360,620	12,789,934	12,835,392	*8,754,117	*11,474,772
St. Louis, San Francisco & Texas Ry.	*96,547	*92,191	*80,382	*76,354	137,636	137,511	*218,018	*213,865
Georgia & Florida R. R.†	1,917	*37,028	14,319	*25,670	687,908	691,427	*673,589	*717,097
Great Northern Ry.	19,584,595	14,479,276	23,712,243	18,053,990	15,025,818	15,341,430	8,686,425	2,712,560
Green Bay & Western R. R.	193,229	134,576	243,504	173,018	9,747	479	233,757	172,539
Gulf, Mobile & Northern R. R.	1,130,851	830,410	1,292,055	991,022	864,667	875,434	427,388	115,588
Illinois Central System:								
Central of Georgia Ry.†	554,686	253,987	1,127,336	628,485	3,756,006	3,620,352	*2,628,670	*2,991,867
Gulf & Ship Island R. R.	*257,223	*305,485	*232,293	*277,188	65,512	70,982	*297,805	*348,170
Illinois Central R. R.	15,717,031	14,712,384	18,766,621	17,825,177	16,546,218	16,711,081	2,220,403	1,114,096
Yazoo & Mississippi Valley R. R.	2,096,097	2,103,975	2,184,499	2,203,854	2,184,499	2,203,854	.....	.....
Illinois Terminal R. R.	1,275,333	830,691	1,301,988	859,002	774,250	770,117	527,738	88,885
Kansas City Southern Ry.	3,157,032	2,866,815	3,526,855	3,121,700	2,732,536	2,774,426	794,319	347,274
Kansas, Oklahoma & Gulf Ry.	864,909	692,043	931,143	758,168	268,690	269,897	662,453	488,271
Lake Superior & Ishpeming R. R.	1,209,260	*79,608	1,210,070	*76,660	7,483	467	1,202,587	*77,127
Lehigh & Hudson River Ry.	184,117	128,218	209,310	156,470	3,482	693	205,828	155,777
Lehigh & New England R. R.	1,235,324	705,981	1,257,971	730,174	396,244	392,376	861,727	337,798
Lehigh Valley R. R.	7,149,326	3,906,449	7,945,814	4,785,627	8,004,370	8,066,240	*58,556	*3,280,613
Louisiana & Arkansas Ry.†	1,588,028	1,329,866	1,646,554	1,413,007	939,219	961,694	707,335	451,313
Maine Central R. R.	2,181,323	1,367,268	2,656,356	1,790,714	2,082,913	2,093,337	573,443	*302,623
Midland Valley R. R.	398,230	408,771	493,497	483,196	466,820	463,281	26,677	19,915
Minneapolis & St. Louis R. R.†	1,046,545	679,104	1,116,468	749,783	3,030,624	2,993,359	*1,914,156	*2,243,576
Mississippi Central R. R.	*8,072	37,965	*5,323	40,764	130,714	130,954	*136,037	*90,190
Missouri & Arkansas Ry.	40,212	6,972	42,165	8,906	3,429	2,506	38,736	6,400
Missouri-Kansas-Texas Lines‡	1,284,208	865,737	1,643,971	1,190,067	5,143,535	5,039,233	*3,499,564	*3,849,166
Missouri Pacific System:								
Beaumont, Sour Lake & Western Ry.†	434,993	451,754	437,871	456,751	174,801	174,700	263,070	282,051
International-Great Northern R. R.†	*204,174	*602,061	*156,861	*558,636	2,813,538	2,822,127	*2,970,399	*3,380,763
Missouri-Illinois R. R.†	641,420	100,617	644,131	105,182	148,058	137,567	496,073	*32,385
Missouri Pacific R. R.†	7,195,989	5,479,497	7,927,072	6,474,033	21,020,335	21,241,993	*13,093,263	*14,767,960
New Orleans, Texas & Mexico Ry.†	684,121	657,566	1,753,156	743,285	2,797,904	2,794,189	*1,044,748	*2,050,904
St. Louis, Brownsville & Mexico Ry.†	1,657,928	1,251,301	1,738,672	1,341,606	797,291	805,373	941,381	536,233
San Antonio, Uvalde & Gulf R. R.†	*231,848	*502,943	*221,695	*491,171	242,313	244,432	*464,008	*735,603
Texas & Pacific Ry.	4,365,221	4,771,419	4,953,170	5,495,482	3,992,570	4,073,626	960,600	1,421,856

* Deficit or other reverse items.

† Report of receiver or receivers.

‡ Report of trustee or trustees.

§ Under trusteeship, Erie R. R. only.

¶ Includes Chicago, Rock Island & Gulf Ry.

⌘ Includes Louisiana, Arkansas & Texas Ry. (merged July 1, 1939).

⌘ Includes Missouri-Kansas-Texas R. R. and Missouri-Kansas-Texas R. R. of Texas.

Selected Income Items by Regions and Districts, Class I Steam Railways, 1939 and 1938—Continued

Region and Railway	Net Railway Operating Income		Total Income		Total Deductions		Net Income	
	1939	1938	1939	1938	1939	1938	1939	1938
Monongahela Ry.	\$1,254,230	\$935,507	\$1,266,902	\$949,363	\$639,749	\$645,698	\$627,153	\$303,665
Montour R. R.	843,516	660,273	847,817	665,243	87,515	90,606	760,302	574,637
Nevada Northern Ry.	225,509	161,160	236,588	175,058	1,101	1,371	235,487	173,687
New Haven System:								
New York, New Haven & Hartford R. R.†	8,462,922	517,047	11,254,391	2,942,830	14,168,505	14,566,023	*2,914,114	*11,623,193
New York, Ontario & Western Ry.†	*496,675	*599,496	*464,068	*576,767	1,418,716	1,417,547	*1,882,784	*1,994,314
New York Central Lines:								
New York Central R. R.	37,303,427	15,582,476	54,196,848	30,756,142	49,687,612	50,910,499	4,509,236	*20,154,357
Pittsburgh & Lake Erie R. R. ..	3,806,716	1,803,166	4,316,402	2,054,682	726,153	356,161	3,590,249	1,698,521
New York Connecting R. R.	1,318,029	1,309,242	1,342,326	1,324,536	1,326,580	1,326,787	15,746	*2,251
Norfolk & Western Ry.	31,659,216	21,722,288	34,399,614	24,395,322	3,810,299	3,856,480	30,589,315	20,538,842
Norfolk Southern R. R.†	350,933	222,259	531,320	399,999	884,583	889,407	*353,263	*489,408
Northern Pacific Ry.	10,479,237	6,297,356	14,827,848	10,560,456	14,754,195	14,882,872	73,653	*4,322,416
Oklahoma City-Ada-Atoka Ry.	57,447	18,686	59,942	21,314	38,971	19,627	20,971	1,687
Pennsylvania System:								
Long Island R. R.	258,095	*217,965	734,250	208,277	2,472,402	2,417,953	*1,738,152	*2,209,676
Pennsylvania R. R.	77,304,328	57,332,898	114,168,558	93,559,078	82,136,033	82,512,978	32,032,525	11,046,100
Pennsylvania - Reading Seashore Lines	*1,812,029	*2,133,217	*1,634,172	*1,956,391	1,069,645	1,074,067	*2,703,817	*3,030,458
Pere Marquette Ry.	3,352,085	853,602	3,712,648	1,167,599	3,384,492	3,427,402	328,156	*2,259,803
Pittsburgh & Shawmut R. R.	32,648	*74,257	40,140	*49,709	16,555	24,683	23,585	*74,392
Pittsburgh & West Virginia Ry.	1,076,852	627,867	1,412,613	725,525	932,402	925,738	480,211	*200,213
Pittsburgh, Shawmut & Northern R. R.†	116,598	45,096	122,354	51,095	129,211	128,201	*6,857	*77,106
Reading System:								
Central R. R. of New Jersey†	1,943,304	259,144	2,877,613	1,178,294	5,454,655	5,443,119	*2,577,042	*4,264,825
Reading Co.	11,931,004	10,104,324	13,852,816	12,379,101	9,131,165	9,083,792	4,721,651	3,295,309
Richmond, Fredericksburg & Potomac R. R.	1,214,911	635,005	1,432,862	855,111	343,525	339,801	1,089,337	515,310
Rutland R. R.†	135,445	*530,677	191,588	*480,396	412,790	411,401	*221,202	*891,797
Seaboard Air Line Ry.†	3,594,371	1,449,486	3,931,714	1,764,724	9,488,269	9,354,885	*5,556,555	*7,590,161
Southern System:								
Alabama Great Southern R. R.	1,768,249	1,414,642	2,665,640	2,062,635	554,589	566,456	2,111,051	1,496,179
Cincinnati, New Orleans & Texas Pacific Ry.	5,185,058	3,996,690	5,274,406	4,086,028	1,871,624	1,872,237	3,402,782	2,213,791
Georgia Southern & Florida Ry.	118,777	29,789	127,030	37,364	296,658	304,016	*169,628	*266,652
Mobile & Ohio R. R.†	1,024,006	964,186	1,085,442	1,024,104	1,526,366	1,582,450	*440,924	*558,346
New Orleans & Northeastern R. R.	503,713	415,098	529,419	441,986	395,827	395,942	133,592	46,044
Northern Alabama Ry.	109,264	36,096	109,834	36,441	109,444	109,529	390	*73,088
Southern Ry.	20,521,866	14,343,565	23,781,719	16,439,955	17,294,383	16,937,727	6,487,336	*497,772
Southern Pacific System:								
Northwestern Pacific R. R.	*354,801	*921,446	*335,942	*903,621	1,454,709	1,491,834	*1,790,651	*2,395,455
St. Louis Southwestern Lines†	1,142,599	2,020,021	1,223,105	2,102,892	3,241,426	3,029,769	*2,018,321	*926,877
Southern Pacific Co.	23,254,992	10,959,982	43,166,358	32,694,353	37,410,986	30,268,914	5,755,372	2,425,439
Texas & New Orleans R. R.	5,173,417	3,337,021	5,481,405	3,650,649	4,524,593	4,835,593	956,812	*1,184,944
Spokane, Portland & Seattle Ry.	821,023	721,778	1,046,406	892,265	3,682,702	3,696,310	*2,636,296	*2,804,045
Tennessee Central Ry.	298,841	243,256	328,064	259,538	242,938	214,847	85,126	44,691
Texas Mexican Ry.	82,469	10,790	96,464	23,495	502,372	496,754	*405,908	*473,259
Toledo, Peoria & Western R. R.	346,484	329,071	361,484	349,168	84,266	83,690	277,218	265,478
Union Pacific R. R.	20,233,188	19,867,391	37,916,098	37,268,254	18,949,466	18,567,020	18,966,632	18,701,234
Utah Ry.	61,624	*50,031	65,017	*46,302	1,105	57,251	63,912	*103,553
Virginian Ry.	9,028,510	7,879,135	9,109,876	7,959,051	2,353,279	2,386,495	6,756,597	5,572,556
Wabash System:								
Ann Arbor R. R.†	368,563	118,136	385,211	135,893	451,688	460,296	*66,477	*324,403
Wabash Ry.†	3,559,246	1,297,490	3,993,788	1,652,191	7,535,972	7,780,082	*3,542,184	*6,127,891
Western Maryland Ry.	4,775,969	3,643,434	4,909,286	3,792,816	3,347,185	3,337,355	1,562,101	455,461
Western Pacific R. R.†	1,674,490	*932,450	1,965,467	*599,652	3,933,106	3,850,837	*1,967,639	*4,450,489
Wheeling & Lake Erie Ry.	4,083,761	2,184,561	4,226,895	2,330,726	648,612	636,798	3,578,283	1,693,928

* Deficit or other reverse items.

† Report of receiver or receivers.

‡ Report of trustee or trustees.

|| Includes St. Louis Southwestern Ry. and St. Louis Southwestern Ry. of Texas.

D. L. & W. Lightweight Box Cars

(Continued from page 490)

pine dressed 1¼ in. thick by 5¼ in. face. The floor planks are laid, in one piece, from side sill to side sill. Each floor board is held in place by three ½-in. MacLean-Fogg watertight bolts with lock nuts. After the floor was laid, it was sealed by applying caulking cement at the ends and sides in order to make the car completely grain tight. The watertight bolts have the heads pulled in ¼ in. below the surface of the floor boards.

The trucks are the Symington spring-plankless double-truss design with cast-steel side frames having journal boxes cast integral. The truck wheel-base is 5 ft. 6 in. Each truck spring group consists of five outer single A. A. R. Type D-2 coil springs and one Cardwell Type A friction bolster spring. The truck bolsters are cast steel with center plates cast integral. Stucki rocker roller side bearings are used on the truck bolsters with hardened steel body side bearings. The truck axles conform to A. A. R. specification M-101-37 and have 5½-in. by 10-in. burnished journals. The wheels are 33 in. diameter chilled cast iron, with treads ground after mounting. The journal bearings are A. A. R. standard 5½-in. by 10-in. journals, lead lined, furnished by the

Magnus Metal Corporation. The brake beams are A. A. R. No. 15 beams with malleable-iron heads, manufactured by the Buffalo Brake Beam Company. The brake hangers are the Schaeffer drop forged loop type. Creco four-point brake beam supports are used on the trucks. The cars are equipped with cast steel striking castings, Cardwell Type L-25-SA friction draft gears, and Union centering devices. The couplers are A. A. R. Type E bottom-rotary-operated swivel-shank couplers slotted for 6-in. by 1½-in. keys.

The brake equipment on these cars is schedule AB-10, furnished by Westinghouse, with brake rigging designed to produce a braking force equal to 65 per cent of the lightweight of the car at 50-lb. cylinder pressure. Extra-heavy wrought-iron pipe is used for the brake pipe and retaining-valve pipe with extra-heavy pipe fittings. The air-brake piping is secured to the car by Wright pipe clamps. The hand-brake equipment was supplied by the Ajax Hand Brake Company and is designed to develop 3,950-lb. pull at the brake-cylinder push rod connection to the cylinder lever.

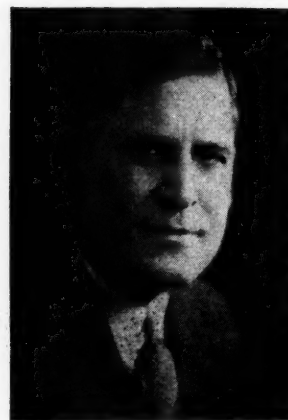
The car bodies were finished with three coats of red lead and paint, the final coat being D. L. & W. standard freight-car brown. The underframe, trucks and roof are painted black. The stencilling on the cars is white.



H. H. Talboys
President



R. B. Fisher
President-Elect



C. H. White
Secretary

N. R. A. A. Holds Successful Exhibition at Chicago

82 Companies participate in display of latest developments in equipment and materials for railway maintenance and construction

FOR the third consecutive year and coincident with the convention of the American Railway Engineering Association, the National Railway Appliances Association presented a highly interesting and successful exhibit at the International Amphitheatre on March 11 to 14, with 82 manufacturers participating. This was the twenty-ninth time that the association has exhibited in connection with the meetings of the A. R. E. A., yet there have been few times when the individual exhibits, or the exhibition as a whole, have approached as high a standard as was maintained this year.

This exhibit has always been noted for the breadth of its scope, and this year was no exception. With prospects bright for maintenance activity to be continued on a somewhat higher level than during last year and with indications pointing to a wider use of work equipment, the exhibit contained many features of interest to those in the track, the bridge and building and the water-service departments. They were afforded an opportunity to familiarize themselves with the latest developments in the products of those manufacturers who are showing their materials and equipment, in a way that cannot be equalled at any other time during the year. This is the third consecutive time that the exhibit has been held in the International Amphitheatre, to which it was transferred two years ago because of the larger and more modern space for display purposes, and more favorable restaurant and dining facilities and rooms for meetings.

As in previous years, the N. R. A. A. provided free, chartered bus service between the convention hotel and the Amphitheatre, on a frequent schedule during the meeting hours to provide the maximum convenience for those attending the convention. More than 700 representatives of manufacturers were on hand at the exhibit to receive visitors and to explain the merits and operating details of their products, many of which were new

and on display for the first time, or were improved materially during the last year.

By the time the exhibit closed on Thursday afternoon, more than 8,000 persons had been admitted, including, in addition to those attending the convention, many supervisory officers from Chicago and vicinity; a considerable number of purchasing officers; members of committees of the Signal Section, which were holding meetings in Chicago during the week; and a number of executive officers.

The officers of the N. R. A. A. who were charged with the responsibility for arranging and conducting the exhibit this year were: President, H. H. Talboys (Nordberg Manufacturing Company), Milwaukee, Wis.; vice-president, R. B. Fisher (The Buda Company), Harvey, Ill.; secretary, C. H. White (Industrial Brownhoist Corporation), Chicago; treasurer, J. S. Hutchins (Ramapo Ajax Div., American Brake Shoe & Foundry Company), Chicago; Directors—T. E. Rodman (Maintenance Equipment Company), Chicago; E. D. Cowlin (Eaton Manufacturing Company, Reliance Spring Washer Division), Massillon, Ohio; W. J. Hanna (Republic Steel Corporation), Chicago; R. C. Flodin (International Harvester Company), Chicago; C. D. Young (Metal & Thermit Corporation), Chicago; V. E. McCoy (National Aluminate Corporation), Chicago; and C. E. Ward (U. S. Wind Engine & Pump Co.) Batavia, Ill.

At the annual meeting on March 12, President Talboys reviewed the operations of the association for the year, and called special attention to the substantial assistance that had been given by the officers of the American Railway Engineering Association and of the Association of American Railroads in perfecting the arrangements for the exhibit. He reported that there was an increase of eight in the number of exhibitors, compared with last year, and that it was expected that a refund of 15 per cent. will be made to exhibitors.

Secretary White reported a membership of 110, including 81 exhibiting and 29 associate members. Treasurer Hutchins reported that it was estimated that the year would be closed with a balance of approximately \$33,000 in the treasury after the 15 per cent refund had been distributed.

E. D. Cowlin, chairman of the Committee on Consolidation reported that the proposal to concentrate the meetings of the various railway associations within a limited period or to consolidate them, had been referred to the various organizations that will be affected by such consolidation, and that no further report was possible until these associations have acted.

A revision of the by-laws was approved and made retroactive, which provides that past presidents shall remain as honorary directors for three years after their terms of office have expired.

In the election of officers Mr. Fisher was advanced to the presidency; Mr. Hutchins was elected vice-president and Mr. Hanna was elected treasurer; and Mr. White was re-elected secretary: Directors—Lem Adams (Oxweld Railroad Service Company) and Clarence L. Mellor (Barco Manufacturing Company) were elected directors for three years. The companies participating in the exhibit, with the products on display and the representatives present are as follows:

Exhibiting Members

Adams & Westlake Company, Chicago; E. R. Krause, E. H. Leisch, W. J. Porter, W. A. Smith and H. G. Turney.

Air Reduction Sales Co., New York; oxygen and acetylene gas welding and cutting apparatus and supplies, electric arc welding machine and electrodes, literature, cropping rail ends with radiograph, demonstration of rail-end hardening with gas heat-treating machine, samples of rebuilt hand tools, rebuilt switch point, fabricated offset angle bar, specimens welded pipe, flame cleaning and dehydrating; C. B. Armstrong, A. W. Brown, C. C. Campbell, J. W. Creely, C. A. Daley, J. F. Franzen, J. T. Gillespie, Jr., W. H. Handrock, H. A. Hocking, F. L. Huggins, J. W. Kennecic, W. T. Love, L. T. McDowell, U. F. Portel, E. F. Turner, E. J. Walters, M. Weist, D. J. Williams, R. B. Woodruff and I. B. Yates.

Alcoma Railway Equipments, Chicago; tie puller, Evertite joints, movies; C. O. Bradshaw, E. C. Neal and Geo. Neal.

American Car & Foundry Co., New York; automatic electric steel-bar heater, electric rivet heater, electric metal heaters for upsetting and heat treating; W. J. Bisset, F. C. Cheston, H. C. Cheston and A. G. Wood.

American Fork & Hoe Co., Cleveland, Ohio; adzes, ditch-bank blades, shovels, spades, scoops, axes, hammers, scythes, brush hooks and weed cutters; H. C. Branahl, C. C. Connolly, George L. Dunn, S. L. Henderson, A. Milligan, J. J. Nolan, F. J. Reagan, John Skeel and R. J. Whelan.

American Hoist & Derrick Co., Minneapolis, Minn.; action pictures of cranes, crosby clips; W. E. Bugbee, J. E. Carroll, S. M. Hunter, Ward B. Mauer, R. W. Payne, S. H. Smith and H. O. Washburn.

Ardco Manufacturing Company, Hoboken, N. J.; rail and flange lubricator; James J. Carlock and Charles Stern.

Armco Railroad Sales Company, Middletown, Ohio; asbestos-bonded metal culverts, blast plates, metal retaining walls, multi-plate culverts, tunnel liner plates, spiral welded pressure pipe, perforated pipe, smoke jacks, portable air-pressure pipe; C. H. Anderson, H. M. Arrick, R. Y. Barham, G. R. Betts, E. L. Brown, C. M. Colvin, E. T. Cross, W. N. Crout, R. B. Faries, E. Harbeck, Logan T. Johnston, W. J. Kelly, W. P. Lipscomb, N. A. Powell and W. O. Robertson.

Association of American Railroads; Robert S. Henry and H. F. McLaury.

Barco Manufacturing Co., Chicago; gas hammers, tie tampers; F. N. Bard, W. J. Behlke, B. H. Ferguson, C. O. Jenista, L. J. Lytle, C. L. Mellor and F. B. Nugent.

Boderick & Bascom Rope Co., St. Louis, Mo.; wire rope, wire rope fittings, slings, model of wire rope machine, wire testing machine; Geo. Born, D. E. Dickey, A. E. Glick, E. F. Graubner, H. S. Mitchell and Fred Zimmerman.

Buda Co., Harvey, Ill.; track jacks, tie tampers, rail bender, car stops, track liners, re-railers, bonding drill, track drill, section and inspection motor cars, electric crossing gate, tool grinder, switch stands, tie spaces, gages, levels, light gasoline-powered delivery truck, tie puller, motor-car parts; R. M. Blackburn, H. S. Brown, S. T. Comfort, J. S. Dempsey, R. B. Fisher, F. L. Gormley, R. K. Mangan, C. T. Miller, M. J. Rotroff, Wood Sanford, G. A. Secor, L. O. Stratton, H. Thorson and E. H. Walker.

Chicago Pneumatic Tool Company, New York; high-cycle tampers, pneumatic tampers, gasoline-driven tampers, pneumatic spike drivers, pneumatic and electric screw spike drivers, demolition tools, pneumatic clay digger, pneumatic and electric concrete vibrators, impact wrench; H. G. Barbee, C. L. Butler, P. J. Christy, S. E. Congdon, H. R. Deubel, T. P. Harris, W. Pallowick, E. S. Rosselle and W. E. Stockwell.

Chipman Chemical Co., Inc., Bound Brook, N. J.; chemical weed killer, photographs of spraying equipment; Charles M. Bernuth, N. S. Leavitt, W. H. Moyer, I. J. Strain and J. A. Williams.

Crerar, Adams & Co., Chicago; rust preventative, portable hydraulic units, jacks and presses, tie squeezer, handles for track tools, die starter, track and bonding drills, demolition tools, pipe bender, knock-out punches, pipe wrenches, fire extinguishers, tool grinders, car cleaner, crayons, tools, air compressors, track shovels, tool handles, hydraulic culvert and pipe pushers; R. Besant, C. W. Borneman, E. Dunlap, Geo. J. Doyle, Adolph Hawkinson, Al. Kapola, Irving Poehler, J. K. Stewart, Hugh Stringham and J. M. Temple.

Cullen-Friedstedt Co., Chicago; anti-slip rail tong, moving pictures of rail crane, clamshell and lifting magnet; W. C. Bamber, K. J. Beller, L. B. Beraux, C. J. Bronez, E. V. Cullen, F. J. Cullen, F. P. Cullen, T. G. Frazee, G. H. Goodell, R. W. Jamison, F. L. Kendig and J. F. Leonard.

Dearborn Chemical Co., Chicago; water treating equipment, pumps, chemical, No-Ox-Id rust preventives, water testing equipment, chemical proportioning pumps, signal foam-meter, process for corrosion prevention; D. B. Bishop, Don Bodishbaugh, L. D. Brown, G. R. Carr, R. A. Carr, Robert E. Carr, R. F. Carr, Jr., W. Carrick, E. M. Converse, E. R. Glover, E. A. Goodnow, L. O. Gunderson, W. H. Hinsch, F. B. Horstman, J. F. Johnson, S. C. Johnson, E. L. Konigsmark,

One Section of the Exhibit at the International Amphitheatre



- Mark McBrien, R. J. Maginn, R. Q. Milnes, A. C. Moeller, A. M. Novak, R. L. Oliver, C. C. Rausch, A. H. Reynolds and B. H. Stone.
- DeSanno & Son, A. P., Inc., Philadelphia, Pa.; abrasive wheels and abrasive cutting machine, literature; J. Costello, B. G. Hardy, S. M. Hershey, A. E. Peterson, E. J. Rohan and W. K. Whelan.
- Dickinson, Inc., Paul, Chicago; smoke jacks, chimneys for small buildings, roof and deck drains, roof ventilators (full size and models), exhaust heads and wall scuppers; A. J. Filkins, E. M. Filkins, William Harrison and H. Knutson.
- Duff-Norton Manufacturing Co., Pittsburgh, Pa.; track jacks, automatic lowering jacks, ball-bearing self-lowering jacks, standard speed jacks, air-motor-operated power jacks, sidelift track jack, journal jack, tie spacer, track lining jack, bell base screw jacks, bridge jack, tie puller; D. F. Evans, Walter Floyd, J. Gilchrist, George Mayer, A. Roberts, C. N. Thulin and E. E. Thulin.
- Eagle Grinding Wheel Company, Chicago; grinding wheels; John Abram, L. E. Buckingham, R. S. Lloyd and J. C. Rinehart.
- Eaton Manufacturing Co. (Reliance Spring Washer Division), Massillon, Ohio; rail joint spring washers, rail bonding washers, locomotive spring washers; E. D. Cowlin, E. C. Gross, H. J. McGinn, R. L. Shireman and A. H. Weston.
- Elastic Rail Spike Corp., New York; elastic rail spike; W. A. Fisher, A. C. Jack and B. Kuckuck.
- Electric Tamper & Equipment Co., Ludington, Mich.; electric vibratory tampers, tooth-tip tamper blades, electric generator sets, vibrators for concrete placement, spot tamper outfit, literature; G. E. Cartier, H. W. Cutshall, J. F. Hensel, Corwill Jackson, E. R. Mason, L. S. Osborn, G. L. Walters, J. Webb and M. S. Westlund.
- Fairbanks, Morse & Co., Chicago; platform and dial scales, parts for motor cars, Diesel engine, pumps, air-conditioning unit, gasoline-driven electric lighting plant, heavy and light section cars, patrol cars, welded and bolted steel wheels, one-piece welded steel wheels and differential axle; L. T. Allis, G. R. Anderson, W. F. Anderson, K. E. Barrett, H. N. Baum, E. L. Benson, O. H. Brauer, E. P. Chase, E. J. Coverdale, J. F. Cruikshank, W. C. Dehn, C. T. Fugitt, E. C. Golladay, W. R. Grant, D. Hopkins, E. F. Kultchar, R. F. Lane, D. K. Lee, M. B. MacNeille, J. M. McCarthy, C. G. Mahana, W. L. Nies, C. B. O'Neil, J. W. Prewitt, C. A. Rauch, F. C. Snyder, H. E. Vogel and C. H. Wilson.
- Fairmont Railway Motors, Inc., Fairmont, Minn.; gang cars, standard section cars, inspection cars, light section cars, bridge and building cars, heavy-duty cars, weed mowers, motor car accessories; John Abplanalp, George Adams, O. F. Banke, C. P. Benning, John Boyce, C. W. Brhel, W. D. Brooks, K. K. Cavins, C. J. Dammann, W. G. Day, D. E. Doolittle, I. N. Eustis, A. R. Fletcher, R. W. Jamison, C. H. Johnson, W. F. Kasper, H. R. Langman, R. H. McCune, J. T. McMahon, G. E. Neffeler, V. Pagett, R. W. Payne, H. W. Proetzler, C. L. Rager, W. H. Ripken, F. G. Simmons, H. A. Sly, R. W. Stenzel, Ira Sublett, L. D. Whitaker and W. M. Williamson.
- Fulton Asphalt Company, Chicago; asphalt blocks, Model Ry.; I. McDonald, J. C. Schmidt, Jr., and J. C. Schmidt, III.
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- O. F. Jordan Co., East Chicago, Ind.; movies of Jordan spreader, model of Jordan spreader, photos of Jordan spreader; A. W. Banton, J. C. Forbes, H. M. McFarlane, W. J. Riley and C. W. Shipley.
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- Loftus & Son, La Crosse, Wis.; rail straightening machine; E. H. Brick, D. W. Loftus, J. W. Loftus, J. W. Loftus, Jr., and J. T. Loftus.
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- National Lead Company, New York; Dutch Boy red and white lead, cinch anchorage special ties; T. Ancliffe, J. O. W. Belt, R. D. Baker, W. S. Carlisle, Hugh Millen and J. O. Meyer.
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- Nordberg Manufacturing Co., Milwaukee, Wis.; surface grinder, utility grinder and accessories, lag-screw driver, track drill, adzing machine, power jack, spike puller, power track wrench, frog and crossing grinder, precision grinder; W. E. Bugbee, C. P. Clemens, W. W. Fitzpatrick, C. K. Jensch, Eugene Larson, R. W. Payne, F. M. Read, Will Reaves, S. H. Smith, H. H. Talboys, Halwin Wegner and F. S. Wonham.
- Oxweld Railroad Service Co., Chicago; motion pictures and samples of pressure butt-welded rail; welding equipment, floodlights, heat-treated joints; Lem Adams, M. C. Beymer, G. P. Bogert, M. Burnett, Jr., W. E. Campbell, E. Cordeau, F. J. Duffie, F. Finsthwaite, A. F. Garberding, E. B. Hall, Jr., H. W. Hicks, S. Hopkins, P. Hunter, Jr., May Kinney, Wm. Leighton, Wm. Matthes, B. Miller, H. Miller, G. B. Moynahan, D. H. Pittman, J. H. Rodger, L. C. Ryan, H. W. Schulze, J. C. Stephenson, F. C. Teichen and J. E. Winslow.
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chanical switchman-shoulder bolts, and gage rods; W. F. Brietzke, A. R. Hearl, C. A. Johnson, C. F. Lanberg, G. R. Lyman, W. E. Olds and G. J. Slibeck.

Philadelphia Steel & Wire Corp., Philadelphia, Pa.; display of spring washers; Waldo E. Bugbee, Geo. M. Hogan, John E. Hogan, John M. Newkirk, Stanley H. Smith and C. C. Washer.

Pocket List of Railroad Officials, New York; copies of publication; Harold A. Brown and B. J. Wilson.

Power Ballaster Company, Chicago; photographs, working model of cribbing machine, motion pictures, power track ballaster; W. E. Bugbee, Ralph Payne, F. H. Philbrick, L. L. Schreck and Stanley Smith.

Rail Joint Co., New York; standard and insulated joints, armored insulated joint, alloy compromise joints, center-overfill joint, insulating fibre, Hill & Scholes tie plate assemblies, R.M.C. plastic rail joint packing, working model of U. of Ill. rolling load machine with photoelastic demonstration of load effect; E. W. Backes, Alex Champman, E. A. Condit, W. E. Gadd, S. Harrison, H. C. Hickey, G. H. Larson, J. N. Meade, J. G. Miller, R. W. Payne, Thos. Ryan and E. F. Schermerhorn.

Railroad Accessories Corp., New York; power track machines for tightening and loosening nuts and setting screw spikes, Raco micro cutout, tie boring machine and Everett MW track drill; S. G. Ellis, B. A. Lundy and B. A. Lundy, Jr.

Rails Co., New Haven, Conn.; compressor screw spikes, compression spring rail spike, compression-type rail fastenings, M & L plate assembly, full-throated cut spikes, oil snow melters, rail, flange and curve lubricator, crossing flangeway bracket and head insert for worn joint bars; R. E. Bell, L. T. Burwell, W. A. Peck and J. V. Wescott.

Railway Age—Railway Engineering and Maintenance—Railway Engineering and Maintenance Encyclopedia, New York; copies of publications; Geo. E. Boyd, M. H. Dick, J. H. Dunn, L. R. Gurley, S. W. Hickey, Neal D. Howard, Elmer T. Howson, P. D. Juraschek, F. C. Koch, Henry Lee, J. G. Little, H. E. McCandless, H. H. Melville, H. A. Morrison, Charles Packard, E. J. Phillips, L. B. Sherman and J. S. Vreeland.

Railway Purchases and Stores, Chicago; copies of publication; J. P. Murphy, Jr., K. F. Sherran and Ed Wray.

Railway Track-work Co., Philadelphia, Pa.; grinder, portable stock-rail grinder, rail-point cross grinder, portable track grinder, samples of abrasives, literature; H. M. Moorhead, A. M. Nardini and J. Roche.

Ramapo Ajax Div. (American Brake Shoe & Foundry Co.), New York; safety switch stands, rigid switch stands, rail lubricator, literature on manganese crossings, Samson switch with improved fittings, switch point locks; T. E. Akers, G. A. Carlson, G. M. Cooper, J. E. Davidson, H. Hazelton, R. M. Helms, A. F. Hess, D. F. Hilton, P. Hoffman, J. V. Houston, A. F. Huber, J. S. Hutchins, J. P. Kleinkort, W. Muller, E. F. Needham, W. A. Peddle and W. Perdue.

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Woolery Machine Co., Minneapolis, Minn.; display of power tie cutting machine and blades, single burner weed burner, weed burner, photographs, drawing of switch-thawing machine; A. J. Franke, A. C. Heath and H. E. Woolery.

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Austin-Western Road Machinery Co., Aurora, Ill.
Bethlehem Steel Company, Bethlehem, Pa.
Cleveland Frog & Crossing Co., Cleveland, Ohio.
Cleveland Tractor Company, Cleveland, Ohio.
Dimick-Mosher Products Company, Boston, Mass.
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Kerite Insulated Wire & Cable Co., Inc., The, Chicago.
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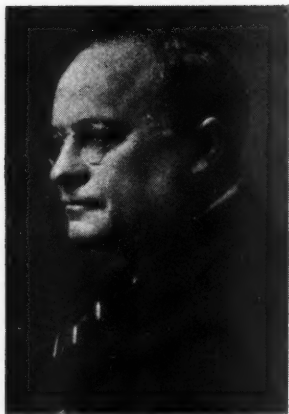
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One of the Three 4,000-Hp. Diesel-Electric Locomotives Recently Built for the C. B. & Q. by the Electro-Motive Corporation—140 Ft. Long, Weighs 308 Tons—Driven by Four General Motors 12-Cyl. 2-Cycle, V-type Diesel Engines (Two in Each Unit) Developing 1,000 Hp. per Engine at 800 R. P. M.—Locomotive Will Maintain Fastest Steam Train Schedules with 19 Heavy Passenger Cars between Chicago and Lincoln, Nebr.



E. M. Hastings
President



G. S. Fanning
President-Elect



F. L. C. Bond
Senior Vice-President

Engineering and Maintenance Officers Meet at Chicago

Increased interest and attendance at A. R. E. A. convention
March 12-14, reflect outlook for increased construction
and maintenance activity

STIMULATED by a continuance of railway car loadings in the present year on a substantially higher level than in the corresponding weeks of 1939, and a general feeling of hopefulness for an unusually active year in every phase of roadway and structures work as budgets have been enlarged on most roads and indications continue that railway traffic and earnings in 1940 will be the largest since 1937, the American Railway Engineering Association held an intensively active and constructive meeting in Chicago on March 12, 13 and 14.

While the annual meetings of this association have always been characterized by studious attention to the work at hand, this characteristic was in evidence more than ever as railway engineering and maintenance officers realize the new problems and added responsibilities with which they are confronted with the generally increased tempo of railway operation and have set out to meet them in the most effective manner. Many of the reports presented at the meeting reflected these added responsibilities, not alone for higher standards of maintenance and construction, but also for the more intensive use of facilities and still greater economies in carrying out all classes of work.

It was the forty-first consecutive annual convention of the association, all of which have been held in Chicago, and, as for a number of years in the past, was held at the Palmer House, with two general sessions on Tuesday, Wednesday and Thursday for the presentation and discussion of committee reports and the transaction of association business. Altogether, a total of 27 standing and special committees presented reports on a wide range of subjects pertaining to tracks, bridges, buildings, water service, signals, work organizations and mechanical equipment, and again many of the reports reflected the keen interest of the association members in thorough-

going investigations and research in the solution of their problems.

Special features of the program included an address at the opening session by C. H. Buford, vice-president, Operations and Maintenance department of the Association of American Railroads; the customary association luncheon on Wednesday, with more than 750 persons present, which was addressed by Judge R. V. Fletcher, vice-president and general counsel, A. A. R., on "The Outlook for Railroad Legislation; and a joint dinner-meeting with the Western Railway Club, the Western Society of Engineers and the Maintenance of Way Club of Chicago on Wednesday night, under the auspices of the Western Railway Club. This latter meeting, which was held at the Hotel Sherman, with more than 800 in attendance, was addressed by Philip Harrington, commissioner of subways and super-highways, City of Chicago, on The Chicago Subway. Coincident with the convention, the National Railway Appliances Association held its twenty-ninth exhibit of equipment and materials of special interest to railway engineering and maintenance officers. For the third consecutive year, the exhibit, as reported in detail elsewhere in this issue, was held at the International Amphitheatre.

All of the general sessions of the convention were presided over by President E. M. Hastings, chief engineer of the Richmond, Fredericksburg & Potomac, assisted by Vice-President Geo. S. Fanning, chief engineer of the Erie, and Walter S. Lacher, secretary. The secretary's report showed that the receipts of the association during the year exceeded disbursements by \$3,912.41 and that the membership as of March 1, 1940, totaled 1,880.

The registration at the convention was 719 members and 483 guests, a total of 1,202 as compared with a regis-

tration of 667 members and 362 guests or a total of 1,029, last year. The 1940 attendance exceeded that for any year since 1930.

The following were elected officers of the association for the ensuing year: President, Geo. S. Fanning, chief engineer, Erie, Cleveland, Ohio; vice-president to serve two years, H. R. Clarke, engineer maintenance of way, C. B. & Q., Chicago; directors, A. A. Miller, chief engineer maintenance of way, Mo. Pac., St. Louis, Mo.; G. P. Palmer, engineer maintenance and construction, B. & O. C. T., Chicago; and Armstrong Chinn, chief engineer, Alton, Chicago. Members of Nominating committee: G. L. Sitton, chief engineer maintenance of way and structures, Eastern lines, Sou., Charlotte, N. C.; J. E. Teal, transportation engineer, C. & O., Richmond, Va.; H. A. Dixon, chief engineer, operation, C. N. R., Montreal, Que.; L. L. Adams, engineer maintenance of way, L. & N., Louisville, Ky.; and G. A. Haggander, assistant chief engineer, C. B. & Q., Chicago. In addition, F. L. C. Bond, vice-president and general manager, C. N. R., Toronto, Ont., and vice-president of the association, was advanced automatically to senior vice-president, succeeding Mr. Fanning.

President Hastings Issues a Challenge

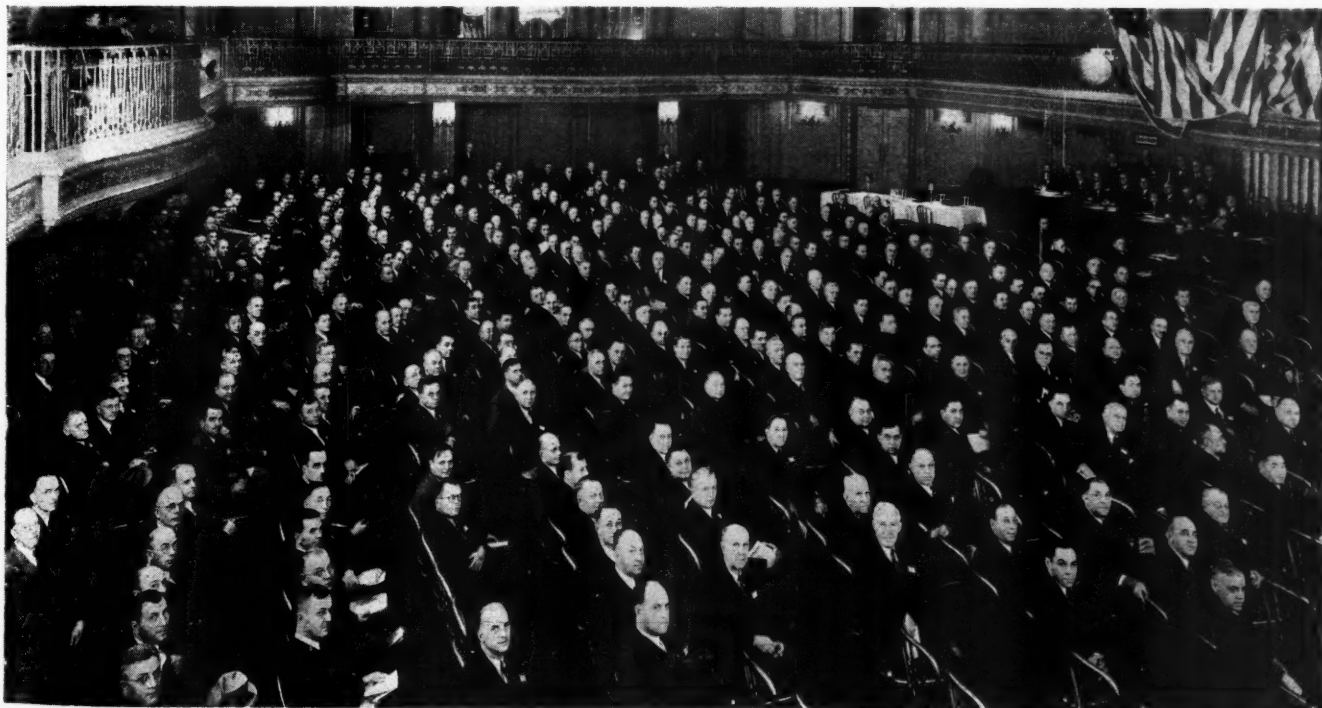
Shortly after calling the convention to order, President Hastings reviewed with satisfaction the regular and special activities of the association during the year with their many resulting accomplishments in the interest of more effective and economical railway transportation, and stressed the fact that these accomplishments and the long history of activities of the association over the years, combine to present a challenge to the members in facing the problems of the future, both as railway officers and as citizens. In the interest of furthering the usefulness of the association, he also spoke of the consideration that is being given to the creation of a junior grade of membership that will admit young men, and

urged greater study and use of the recommendations of the association as found in the Manual of Recommended Practice. He spoke, in part as follows:

"I know of no group having higher qualifications for real citizenship than the group I addressed this morning; I know of no need facing this country at the present time greater than the need for real constructive citizenship. Therefore, I appeal to you not to be satisfied with just following your profession—just working for your railroad—just thinking along technical lines, or just following along with the crowd; rather, I urge you to face the undeniable fact that change is taking place all over the world, and while change may be necessary in many places; yet there are certain fundamental truths and principles upon which we have relied and builded through the years that must be preserved if we are to remain a free and happy people. Therefore, as a group of men and women with minds trained to seek the truth in scientific knowledge, we fail in what is expected of us if we do not extend our thinking and analyses into the fields of government and citizenship."

Mr. Hastings then proposed for future consideration certain suggestions relative to the presentation of committee reports, in the interest of conserving time on the floor of the convention and in stimulating increased discussion, and then spoke at some length of the research work being carried out by the association and of the close understanding and co-operation that exist between the Association of American Railroads and the association in all related activities. In conclusion, he said:

"The closing year in the life of our association has been one filled with the usual activities and marked by many accomplishments that will be made more evident to you as you hear the reports, conclusions and information presented by our committees during the next three days. Having always behind them the splendid bulwark of recorded work of the association, built up through years of painstaking thought and labor, you will find on hearing and studying the reports of this year that the committee workers have pushed forward, seemingly inspired and challenged by the record of the past to record for the association even greater accomplishments for the present and the future. If it is true that 'What is past is prologue' then we are not too ambitious to expect the future to bring to our association through its able membership that which will, added to the present accomplishments, challenge our workers of the future as we are challenged today."



The A. R. E. A. Convention in Session at the Palmer House on Tuesday

"Your Board of Direction has been studying during recent months the question of opening the way to bring young men into our association. In this connection, it is expected that a constitutional amendment will be sent shortly to the membership for vote providing for the creation of a 'Junior' grade, whereby a young man just out of college may be admitted as a junior at a reduced annual fee and continued as such until he reaches an age that would permit him both from age and experience to be transferred to the 'Member' grade. By having a minimum age requirement of 25 years, we have been losing the opportunity of bringing into our association young men who enter railway engineering upon graduation. I strongly urge you to vote favorably upon such an amendment if and when it is presented to you.

"The interest of engineering students in the A. R. E. A. should be enlivened by the contacts they have with members of the association. The Board of Direction has re-established the Committee on Co-operative Relations with Universities and Colleges, through which much can be done to place before students the opportunities in railway engineering, and demonstrate to them the advantage and privilege of membership in the A. R. E. A.

"In the matter of committee work the several committees have covered a wide field and have made a fine contribution to the permanent record of the association during the last year. The information presented and the conclusions reached are worthy of greater attention than they receive, and again I say to you, as I have said in past years, that you are not fulfilling your responsibility to your railroad or to your association unless you use, wherever practicable in your study and in the solution of the problems presented on your own railroad, the recommendations of the association as found in the Manual of Recommended Practice and the information gathered and presented by the committees from year to year."

C. H. Buford Addresses Convention

In an address at the opening session, C. H. Buford, vice-president, Operations and Maintenance department, Association of American Railroads, spoke on the transformation that has taken place in railway service in recent years, the added responsibilities of members of the association resulting, and the need for greater efforts in behalf of "selling" the railroads to the public. He said in part, as follows:

"In 1900, the railroads were sorely in need of both immediate and extensive development. This was brought about by the enormous growth of traffic following the long depression of the Nineties, and by competition, which was forcing the construction of new main and branch lines into what was still undeveloped territory. By 1920, conditions had changed to the extent that Congress embodied in the Transportation act the requirement that railroads must obtain certificates of convenience and necessity before proceeding with the construction of new lines or extensions.

"Today, the conditions are further changed. There are not only no restrictions placed on the building of additional facilities by competing forms of transportation, but also, actual Federal aid for most of them, with the net result that the transportation plant of the United States is being expanded at a rate that bears no relation to present or potential future needs.

"The marked change in the railroad picture has had a profound effect on the problems of the engineer and, by the same token, on the field of usefulness of your association. Formerly, your main responsibility was to aid the engineer in his efforts to complete the construction of new or additional tracks in the shortest time, or in the solution of intricate problems growing out of almost hopelessly congested terminals. Money was plentiful and the slogan was "Speed." Today, your problem relates to such matters as finding the most economical methods of maintaining existing tracks and structures or determining what types of construction can be maintained for the least money. You are engaged in a process of refinement and in investigations of methods and materials that will give us a safer plant for railway transportation.

"You, as engineering officers of the railroads, are directly

responsible and are held to account for the safety of the tracks and structures. These tracks and structures are affected by the size and kind of locomotives and cars and the speed at which they are operated. These related problems demand cooperation, and I am glad to say that I have noted a wholesome trend toward a more sympathetic understanding between the mechanical and engineering divisions of the A. A. R. The Board of Direction of the A. A. R. has appropriated almost \$100,000 for your activities during 1940, and in this way indicates its appreciation of the work you are doing to improve the railroad plant and its service to the public.

"Notwithstanding the remarkable improvements that have been made by the railroads in recent years, we still hear some criticism that they are behind the times; that they are trying to do business today with a plant that has improved little since grandfather's day; that they are backward in research. Most of the people who make such criticism do so because they are ignorant of the facts. For example, six years ago there were only about 40 air-conditioned passenger cars in the United States. Today, we have approximately 12,000 such cars, including coaches, diners, sleepers and lounges.

"Six years ago we had only a few thousand miles of passenger runs scheduled daily at a speed of 60 miles an hour or more. Today, we have about 55,000 miles of passenger runs scheduled at a mile a minute or more. Six years ago, there was not a single streamlined train in the United States. Today, we have more than 100 such trains serving most of the larger cities, and more will be added during the coming spring and summer.

"In 1939 the railroads established the best general safety record in 50 years when the number of train accidents, as compared with the number of miles run by trains, was the lowest on record. Today's freight trains are hauling a larger volume of freight and handling it faster and safer than they did 10 years ago. This fact was demonstrated forcefully when, in September and October of last year the railroads were called upon to handle the most rapid increase in freight business on record. It was done without congestion, delay or general car shortage because of better equipment and better methods. You can rightfully take pride in the amazing transportation performance that was turned in last fall, because the sort of work you do, day in and day out, contributed in no small measure to the ability of the railroads to meet successfully and completely this unprecedented situation.

"All of the improvements mentioned and many more that will occur to you are the direct result of large capital expenditures, exhaustive studies and never-ending research. We cannot afford to let anyone continue to believe that the railroads have failed to modernize their plant or that they are laggard in research. Most people conceive of research as consisting of retorts, crucibles and instruments in the laboratory.

"Railroad research cannot be carried on in the same way as that of most other industries. You know, perhaps better than anyone else, to what great extent the railroads and the manufacturers of rail equipment are engaged in finding better ways and better equipment to do a better job of transportation. You know that millions of dollars are spent annually for this very purpose. But, unfortunately, most of our population knows little or nothing about these things, and the reason for this is because the officers and employees of railroads and the officers and employees of the companies that furnish us with the 70,000 different things we buy and use have not told them. One of our big jobs is to impress on the public mind the immensity and value of our achievements and the rate of our progress. We must tell our story in simple and non-technical terms.

"I know of no group of men that is better qualified and better equipped to tell this story of achievement and progress than is yours. You know the facts better than anyone else, and you know the amount of labor, money and time that has gone into every railroad improvement. You know, too, what these things have meant not only to the railroads, but also to the economic and social welfare of the nation. You can, therefore, tell it with authority and effectiveness, and if you would at every opportunity, along with others who should, the people of this country would realize that the railroads are competent, efficient, progressive and are performing an outstandingly good job. When the people know the facts, they will be more likely to demand that the government take the necessary steps to create a fair field in transportation, a situation that is necessary if our railroads are to continue to render the best possible service at the lowest real cost."

Fletcher Reviews Railway Legislation

Speaking before 825 members and guests at the association's luncheon on Wednesday noon, R. V. Fletcher, vice-president and general counsel of the Association of American Railroads, outlined the outlook for railroad legislation during the present session of Congress and expressed the sincere hope that Congress will not adjourn without giving due recognition to the unfair, discriminatory situation which now prevails in the transportation industry of the country to the detriment of the railways and the public as a whole. The principal bill affecting transportation that is being considered by Congress at the present time, S. 2009, was passed in different forms by the Senate and House, and is now in the hands of a conference committee. It stands a good chance of being voted upon by Congress before the session adjourns. Discussing the various features of the House and Senate bills, Mr. Fletcher said in part as follows:

"Both bills contain a very sound declaration of policy, which commits the Congress to the principle of equality of regulation and which recognizes fully the importance of all forms of transportation. The Senate draft, which differs slightly from the House draft, for the first time in the history of legislation declares a national transportation policy to be applied fairly and in such a way as to recognize and preserve the inherent advantages of each type of transportation. It declares the interest of Congress in safe, adequate, economical and efficient service, to be established and maintained at reasonable rates, without any unjust discriminations or favoritism. The declaration also recognizes the right of employees to have fair wages and equitable working conditions established through collective bargaining.

"The bill measurably improves the present law with respect to consolidations, in that it removes certain obstacles found in the present law, the principal of these obstacles being the requirement that the Interstate Commerce Commission shall formulate and adopt an artificial plan in advance, to which the railroads are required to conform unless they can persuade the commission to modify it. Another of these obstacles relates to the standards which shall govern the Interstate Commerce Commission in passing upon consolidations, these standards being the preservation of competition, the existing channels of trade and commerce and the like. For these difficult and impossible standards, the proposed bill substitutes a single standard, that being the public interest.

"The effect, however, of the wholesome changes in legislation so far as consolidations are concerned, would be largely destroyed by an amendment commonly known as the Harrington amendment, inserted in the House bill which provides 'that no transaction shall be approved by the commission if such transaction will result in unemployment or the displacement of employees of a carrier or carriers, or in the impairment of existing employment rights of said employees.' It is perfectly obvious that if this provision remains in the bill, there can be no motive or incentive to consolidation, however much the public interest might require the practice of economies.

"One principal feature of the bill relates to the regulation of the rates of water carriers. It has long been recognized by every thoughtful student of the question that all forms of transportation engaged in a common competitive field should be subjected to regulation or all should be free from regulation, so that something like equality of opportunity might prevail.

"The bill also proposes that water carriers hauling goods for the public shall be required to publish their rates if they are common carriers and to file their minimum rates if they are contract carriers. The regulation of the water lines is opposed, however, by certain water carriers, many of which are under the control of large shippers who find themselves in the happy position of being free to contract, without publicity or regulation, at rates lower than the rail rates, while at the same time the product is sold upon the basis of the rail rates.

"It is said by some of those who oppose the regulation of the water lines that the remedy lies not in putting regulation on water transportation, but that regulation should be removed from the railroads. However, none of the persons interested in water

transport would be willing to repeal the long and short haul clause or to permit the railroads to engage in water transportation, or to allow the rails to refuse to join in joint through rates with the water lines.

"Another important feature found in the Senate bill but not in the House bill provides for the appointment by the President of a board of three to investigate the question of subsidies and the question of how various forms of transportation can best be integrated in such a way as to make certain that the public is given the privilege of selecting that form of transportation which it finds to be most economical and best suited to its needs.

"It is not pretended that the enactment of this law will solve the railroad problem in the sense that it will transform an industry bristling with difficulties into one which is happy and prosperous. Nothing can take the place of a real revival in business. The railroads have suffered, along with other forms of business, from the general depression which has afflicted the country for more than a decade. They have suffered also from the diversion of immense amounts of traffic to the highways and the water lines, some of which at least have been the beneficiaries of enormous government subsidies.

"No one advocates any sort of legislation which would give the railroads an undue advantage. They are not asking to be subsidized at the hands of a generous government. They are hopeful that if the legislation now pending in Congress is enacted, either in the form of the Senate bill or the House bill, a step will be taken in the process of bringing order into a situation which has been rendered chaotic by reason of the failure to apply the same principle to all agencies of transport.

"No one believes that the railroads are obsolete or obsolescent. It is easy enough to demonstrate their importance in any well-thought-out economic order. The time has passed when they are to be considered as otherwise than useful agencies of transportation, entitled to fair treatment. The proposed legislation recognizes them as essential aids to business and it is sincerely hoped that Congress will not adjourn without giving due recognition to the importance of equality, so that privilege, which is a hateful word in every democracy, may no longer be extended to one group of citizens to the detriment of another."

Report on Electricity

H. F. Brown, Chairman*

This committee reported progress on its assignments to keep the association informed (1) of developments in the application of electricity to railway service; and (2) regarding the principal current activities of the Electrical section, Engineering division, A. A. R.

Under the first assignment, the committee observed that carriers having electrified lines are finding additional advantages and increased flexibility in operation with electric motive power, particularly on lines that handle dense freight traffic. The committee also stated that numerous improvements in the illumination of new car equipment have been made during the year, that electric air-conditioning equipment has been improved and its use extended, and that continued improvement has been made in the design of electrically-operated shop tools, roadway maintenance tools and welding equipment.

In reporting on its second assignment, the committee followed its usual practice of presenting brief synopses of the reports presented by the different committees of the Electrical section at its last meeting. The subjects reported on this year were as follows: Power supply; electrolysis; overhead transmission line and catenary construction; standardization of apparatus and material; electric heating and welding; application of motors; clearances for third-rail and overhead working conductors; protective devices and safety rules on electrified territory; specifications for track and third-rail bonds; illumination; design of indoor and outdoor substations; high-tension cables; application of corrosion-resisting materials to railroad electrical construction; and changes in the Manual. These reports were published in full in Bulletin No. 412, dated September-October, 1939.

In answer to a question from the floor, Chairman Brown explained that a 250-watt infra-red ray heating lamp had been developed for use in drying paints and lacquers which is more

* Assistant Electrical Engineer, New York, New Haven & Hartford.

than four times as fast as previously known methods. He explained that the newly-developed fluorescent lamp produces three times as much illumination for a given amount of power, as ordinary lamps. This reduction in power requirements, he said, is an important factor, especially in car lighting where demands are increasing and battery standby is required when cars are stopped or are moving at slow speeds.

Report on Standardization

F. L. Nicholson, Chairman*

This committee reported on three assignments as follows: (1) What A. R. E. A. recommended practices should be advocated for general use on railroads? (2) what A. R. E. A. recommended practices should be sponsored as subjects for national standardization? and (3) maintain contact with standardization bodies and keep the association informed on important matters developed by such contact.

In reporting on the first assignment, the committee submitted a tabulation of recommended practices selected from the Manual, that it believes worthy of adoption on all roads in the interests of economy and efficiency. Calling attention to the fact that a similar tabulation was published in 1937, the committee stated that it thought it desirable again to bring the matter to the attention of the association. The tabulation is arranged in subdivisions under the names and numbers of the standing committees.

No recommendations were presented this year under the second assignment. In reporting on the third subject, the committee presented (a) a list of representatives of the Association of American Railroads on the council of the American Standards Association and on its Correlating and Advisory committee; and (b) a list of technical projects on which the A. A. R. is now co-operating with the A. S. A., together with the names of members representing the A. A. R. in the consideration of such projects.

The committee also presented a summary of the activities of the Canadian Engineering Standards Association for the year ending March 31, 1939, and a list of collaborating representatives of the A. R. E. A. on committees of the American Society for Testing Materials. This report was received without discussion.

Signals and Interlocking

H. G. Morgan, Chairman†

In accordance with usual practice this committee reported on two assignments, namely: (1) Developments in railway signaling; and (2) principal current activities of the Signal section, A. A. R. Under the first heading the committee noted that a recent development is the introduction of the 11,000-ft. coded track circuit, and explained some of the features and advantages of this circuit. While the first installation of this type was made over a year ago, said the committee, there are about 18 circuits in service at the present time.

The report on the second assignment included a list of 32 subjects on which committees of the Signal section reported at the 1939 convention. Also the report lists the specifications, drawings, requisites and instructions that have been revised by the Signal section, gives the new specifications, drawings, requisites and miscellaneous matter that have been adopted, and lists the drawings and miscellaneous matter that have been removed from the Manual. The committee also directed attention to the fact that there are now available 22 of a series of 24 pamphlets on American railway signaling principles and practices that have been prepared for the education of signal men and others desiring to study this subject.

When presenting the information on coded track circuits, W. M. Post (Penna.) explained that since the report was written one road had installed such circuits on more than 100 miles of line and that another road was planning an extensive installation, indicating that the use of coded track circuits is now beyond the experimental stage. Mr. Post also explained that curves and

other data in the Signal section, A. A. R., proceedings can be used to calculate the cost of stopping trains. For example, he said, a train of 6,450 gross tons, in cars loaded to 80 tons each, was stopped from a speed of 45 m. p. h. and, after standing for 6 min., was accelerated to 45 m. p. h. As a result, the horsepower-hours of work wasted in terms of fuel and water costs was \$2.37.

Economics of Railway Location and Operation

H. M. Stout, Chairman*

In reporting on its 13 assignments, this committee presented final reports, with recommendations regarding Manual material, on four subjects, including Revision of the Manual, offered progress reports on seven assignments, and reported progress in the study of two others.

Revision of the Manual

The committee submitted for adoption and inclusion in the Manual, in place of the material now appearing under the heading "II Power," a condensed version of the report on power that was submitted as information at the convention last year. The data included in this report are designed to simplify the necessary calculations and otherwise facilitate the task of comparing the economic value of various locations and gradients in the light of the characteristics of different types of motive power. They consist principally of descriptions of the characteristics of the various types of power and of a number of sample forms of "work sheets," the object of which is to make it possible to compare their operating advantages.

The report was divided into five parts, the first of which, headed General Principles, was comprised largely of definitions of terms used. Steam, electric and oil-electric locomotives were dealt with separately in different parts of the report, while the fifth section contained instructions for obtaining the fuel or energy consumption of the various types of power.

Under steam locomotives, the committee submitted a table giving, for various classes of locomotives, the percentages of the total weights carried by the drivers and, in each case, the horsepower per ton of weight on the drivers, the object of which is to enable locating and operating engineers to determine approximately the horsepower capacities of the different locomotives. Also included were two sample work sheets for use in calculating the tractive effort and the horsepower output of typical steam locomotives using superheated steam, one being for use when design data are not available and the other for use when such data are to be had. To illustrate the method, a sample application of the latter form to a given set of locomotive data was included.

In the section on electric locomotives were presented formulas for calculating typical speed-tractive effort curves of direct-current and alternating-current locomotives, and sample work sheets based on these formulas were given. This section of the report also contained typical characteristic curves of the different types of electric locomotives, a sample work sheet for motor-generator locomotives and a discussion of electric braking, together with a form for calculating the braking effort and power regenerated by direct-current locomotives.

The section of the report on oil-electric locomotives included, in addition to a discussion of the characteristics of such locomotives, a form for calculating tractive effort and horsepower output, similar to those given for steam and electric power.

This report was adopted without comment.

More Intensive Use of Existing Railway Facilities

Continuing its study of methods of obtaining a more intensive use of existing railway facilities, the committee presented this year, as a progress report, an analysis of the results of the consolidation in 1933, of the West Jersey & Seashore and the Atlantic City railroads to form the Pennsylvania-Reading Seashore Lines. The committee first presented figures showing the extent of the decline that occurred in the traffic of the two predecessor lines following 1929. These were followed by an itemized statement made prior to the consolidation, showing the

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† Signal Engineer, Illinois Central.

* Assistant Valuation Engineer, Northern Pacific.

estimated annual savings that could be effected in operating costs by consolidating the properties and unifying the operations of the two lines, the total of these savings being \$1,452,211. Subsequent to the unification, passenger operations at Atlantic City, N. J., were consolidated in a new station, thus producing additional estimated savings of \$117,138 and increasing the total to \$1,569,349.

Included in the report was a tabular statement comparing the financial and operating results of the two predecessor lines on the one hand (1926 and 1929) with those of the Pennsylvania-Reading Seashore Lines in 1934 and 1937. However, because of the large losses of traffic that occurred, the committee observed that "there is no valid basis for a comparison of operating and financial results under unified operation with those previously noted."

More Economical and Efficient Railway Operations

In reporting on methods and formulas for the solution of special problems relating to more economical and efficient railway operation, the committee continued its investigation of the economic relation between the track structure and the traffic to be handled. It referred to the report on this subject presented last year, in which attention was called to the fact that expenditures for track labor apparently were not in accord with the formulas governing allowances for increased or decreased use as set forth in the Manual, and said that this naturally raises the question as to whether the formulas are in need of revision.

After a thorough study of the data covering the period from 1927 to 1936, the committee came to the conclusion that the fundamental principles embodied in the formulas are sound, but that there are certain factoral adjustments that should be given consideration in the application of the formulas. It pointed out, for instance, that certain changes have taken place in the "Per cent Effected by Use Values" given in the Manual, and illustrated this point by using crossties as an example.

The committee pointed out, however, that the formulas may be used to determine the economical advantage gained over a period of years through improvements in methods and materials. For instance, if a railroad that is kept up to a certain standard over a period of years requires less labor hours for track maintenance than allowed by the formulas, using the labor expenditures of the initial year of the period as a base, then the difference between the hours allowed by formula and the actual hours worked represents the economic advantage gained.

Referring to the statement in the previous report in which it was pointed out that comparison of the actual and theoretical reductions in maintenance expenditures might be made to serve the purpose of measuring amounts of deferred maintenance, the committee alluded to the report on deferred maintenance issued during the year by the I. C. C. Eighteen of the railways included in this analysis that reported no deferred maintenance were also included in the tabulation presented with the committee's report of a year ago. These railways were segregated from the main lists and new weight averages were obtained for the years 1927-8-9 and 1936, showing the section man-hours per equated mile, the gross ton miles per equated mile and the section man-hours per million gross ton-miles per equated mile. These figures were presented in tabulations with this year's report, which was offered as information.

Methods for Determining Most Economical Train Length

In its report on methods for determining the most economical train length, the committee first reviewed briefly previous reports on this subject, which were presented in 1929, 1933, 1934, 1935 and 1938. Using these reports as a basis, a final report was developed which was offered this year for adoption and publication in the Manual. The principle feature of this report was a group of six tables showing the theoretical maximum and most efficient tonnage ratings per ton of locomotive weight for different types of steam locomotives on various grades. A brief discussion of oil-electric locomotives was included, in which the committee stated that, until more data on the weight and construction of Diesel freight locomotives are available, preliminary estimates for their use should be based on steam operations; then, when final conditions are established, the characteristics of a particular design can be used as a basis for the detailed studies required.

The remainder of the report comprised a discussion of the procedure for making analyses of freight train performance. The

requirements for making such analyses were given, which included a list of 12 items of operating data that are necessary. After due consideration of all factors, said the committee, the problem of determining the most economical train length, from a theoretical standpoint, is largely one of comparing locomotive performance under various fixed conditions to decide which of the possible changes in methods of operation is most promising, considered in the light of the capital investment involved, the additional revenue derived, and the maintenance of a low operating ratio. Listed in this section of the report were six factors affecting the economical length of trains, which cannot readily be reduced to mathematical terms. This part of the report was recommended for adoption and publication in the Manual and was so received without comment.

Inland Waterway Transportation

Continuing its study of inland waterway transportation, the committee offered this year a comprehensive study of the economics of such transportation, the subject being considered both in the abstract and by reference to specific waterways. In its abstract discussion, the committee stated that railroads and waterways should receive similar and equal treatment on the part of the government, that every ton of freight lost to the railroads means that the unit cost of the tonnage remaining will be greater, that in comparing different forms of transportation total costs should be considered, and that for various reasons traffic on waterways is subject to frequent interruption.

In considering the economic phase of waterway development, the committee propounded two questions, both of which it discussed at considerable length. These are: (1) By what yardstick should inland waterway development as a whole, or the development of any particular scheme of waterways, be measured? and (2) If the application of such a yardstick indicates that inland waterways should be developed, to what extent should the government undertake to assist in such development?

The committee next offered a comprehensive study of the Ohio river and its principal tributaries which was accompanied by a map of this system and a number of graphs and charts. Following a brief history of the Ohio River system, the committee dealt extensively with the economic aspects of its development and then presented a series of tables giving cost data and other pertinent information regarding the river and its principal tributaries. Somewhat similar treatment was accorded the New York State Barge Canal, after which the committee undertook a detailed analysis of the proposed canal between Lake Erie and the Ohio river.

In presenting this analysis, R. P. Forsberg (P. & L. E.) said that he had read the recent report of the Interstate Commerce Commission on the proposed Lake Erie-Ohio River canal and that he had found the commission to be adverse to the project.

Appended to the report was a set of three conclusions in which, among other things, the committee stated that the annual cost of transportation on the Ohio River system is estimated at about \$34,000,000, of which about one-half is paid or absorbed by the taxpayers and the other half by the users of the waterways; that the construction and maintenance of the New York State Barge canal has not been justified; and that the proposed Lake Erie-Ohio River canal cannot be justified economically. This report was submitted as information.

In discussing this report J. E. Teal (C. & O.), chairman of the subcommittee, said that it is the duty of railroad men to take advantage of every opportunity that is offered to impress taxpayers with the economic folly of spending large sums for waterway projects. Continuing this theme, President Hastings told the members that they should be outspoken in discussing with taxpayers such broad economic problems as those involved in making large expenditures of public funds for inland waterways, and suggested that they make a careful study of the entire report.

High Speed and Operating Expenses

Reporting further on the effect of high speed on railway operating expenses, the committee noted that concurrently with the sharp increase that has occurred in train speeds there has been effected a betterment in track structure and alinement and in maintenance methods, thus making it impossible to determine from any maintenance cost data the effect of high speeds on such costs.

Turning to a consideration of the effect of high speeds on

maintenance of equipment expenses, the committee called attention to the fact that new and radically different designs of equipment are being used in high-speed service and that the unit maintenance costs of these types of equipment cannot yet be determined definitely. The report also contained the results of a study made on a mid-western road to determine the effect on freight train movements in both single and double-track territory of the operation of 12 fast passenger trains.

Effect of Rail Lubrication on Train Operation

The committee's report on the effect of rail lubrication on train operation dealt largely with the results of dynamometer-car tests made on a section of track on the Denver & Salt Lake before and after rail lubricators were installed. The section of track involved is the 45.63 miles of line between Utah Junction, Colo., and the east portal of the Moffat tunnel; 14 mechanical lubricators were installed in this territory. The report describes the physical characteristics of the territory, the make-up of the dynamometer train, the method of making the tests, and the considerations involved in obtaining comparable figures in train-resistance.

Out of the 13 curves in the test territory, there were only 3 in which the determination of curve resistance could be made. On these curves the train resistance before the lubricators were installed, as determined by three test runs, averaged the equivalent of a 0.0276 per cent grade per degree of curve, while after lubrication the average resistance was equivalent to a 0.0137 per cent grade per degree of curve.

The committee offered the following conclusion: Rail and flange lubricators, properly located and functioning, will effect a reduction in train resistance and result in an increase in tonnage ratings where grade on curves controls the train load.

Railway Electrification

For this year's report on the economics of railway location and operation as effected by railway electrification, the committee prepared a preliminary report in the form of a table on the electrification of steam lines in all countries in the Western hemisphere and in Africa, Australia, New Zealand and India. To bring the preliminary report up to date, copies were sent to the Railway section of the Department of Commerce for submission to its representatives abroad, but since the copies have not been returned the table could not be included as a part of the report.

Line and Grade Revisions

The committee's report on the assignment to compile data essential to establish units for making line and grade revisions to meet operating requirements was composed principally of instructions for comparing present costs of operation with those that would prevail after proposed improvements had been made. Included in the report was a list of 25 items of traffic data that are necessary in determining present costs.

Appended to the report was a statement listing the various items making up total operating costs and containing columns placed side by side for present costs and for estimated costs after improvements are made. Individual items in the statement were explained in the report. The committee recommended that this report be accepted for publication in the Manual and it was adopted without comment.

Effects of Speeds in Excess of 75 Miles Per Hour

In reporting on its assignment to determine the effects of speeds in excess of 75 miles per hour on the economics of railway location the committee noted that average speeds of this character require cruising speeds of 95 to 105 miles an hour and that any curve not capable of a comfortable speed of 100 miles per hour is speed restricting. The loss of time that would result because of the presence of speed-limiting curves was illustrated by a velocity profile. A method of comparing the operating features of two or more located lines, which involves the use of the velocity profile, was described and its use explained in detail.

Grades and Alinement Through Tunnels

The principal feature of the committee's report on grades and alinement through tunnels was a tabulation based on replies to a questionnaire which was sent to the major roads in the United States, Canada and Mexico. The committee believes that the

tabulation covers all tunnels in the United States and Canada having a length of 1,000 ft. or more, together with many such tunnels in Mexico. The tabulation listed 433 tunnels on 53 railroads and gave for each tunnel the location, the principal dimensions, the type of lining, the grades and alinement, and such information as the ruling grade, the maximum curvature, the direction of traffic, the weight of the heaviest trains, the type and tractive power of the locomotives in use, and the method of ventilation.

Various summaries and analyses based on the tabulation were prepared by the committee and were included in the text of the report. Explaining that "the entire subject of the economics of railway location and operation * * * is so well epitomized in this single project" the committee presented a brief history and description of the Great Northern's Cascade tunnel, which was quoted from a report published by the National Electric Light Association. Following this portion of the report there was a brief discussion of the question of tunnel gradients and curvature, in which the committee listed the reasons behind the desirability of obtaining easy gradients and flat curves and discussed the economics involved in reducing grades through tunnels to something less than the ruling grade. While this report was submitted as information, a set of five conclusions was appended to it, which the committee recommended be approved for printing in the Manual. These conclusions were adopted.

Report of Committee on Highways

J. G. Brennan, Chairman*

This committee presented a progress report on one assignment, reported progress in the study of three other assignments and presented reports containing recommended Manual material on three subjects, including those on the development of designs and specifications for highway crossings at grade over railway tracks, both steam and electric, lamps on manual and automatic crossing gates, and the striping of crossing gates.

Highway Crossings at Grade Over Railway Tracks

In reporting on its assignment to develop designs and specifications for highway crossings at grade over railway tracks, the committee offered for adoption and publication in the Manual a set of specifications covering the construction of monolithic concrete crossings. These specifications were presented under nine headings, namely (1) general, (2) track structure and size of crossing, (3) track support during construction, (4) design of crossing, (5) rail fillers, (6) end of crossing, (7) concrete, (8) steel and (9) relation of crossing to adjacent pavement.

These specifications were adopted without discussion.

Classifying Grade Crossings With Respect to Hazard

The report of the committee on methods of classifying grade crossings with respect to hazard stated that the work on this subject during the year consisted of a review of the 1938 report and a canvass of the methods now in existence, together with studies of these methods. Referring to the 1938 report, the committee said that a study of this report had indicated the need for correcting and revising the list showing the chief factors of danger at grade crossings. The revised list was presented as part of this year's report.

The committee pointed out that a study of grade crossing accidents had revealed that few such accidents can be allocated to any but the personal element and that in most cases the driver is at fault. In many instances, it said, the primary cause of the accident is not revealed by evidence presented by eye-witnesses, but that it usually will be found in the files of the railroad claim agent. Such evidence, said the committee, should be given due consideration in any study of crossing accidents.

As a result of its study of the various methods of classifying crossings, the committee stated that generally they are of two types, namely, (1) empirical formulas, including consideration of both physical and traffic elements, and (2) methods based on traffic alone. This was submitted as a progress report.

Lamps on Manual and Automatic Crossing Gates

As its report on lamps for manual and automatic crossing gates, collaborating with the Signal Section, the committee offered nine

* Engineer Grade Crossings, Association of American Railroads.

items of recommended practice for adoption and publication in the Manual upon the completion and adoption by the Signal section of the specifications for the design of the lamp unit and the operating mechanism. These items were adopted.

Striping of Crossing Gates

In reporting on the striping of crossing gates, the committee offered for adoption and inclusion in the Manual as recommended practice a drawing showing the striping of highway crossing gate arms for use on both automatic and manually-operated gates. This drawing was accepted with the understanding that before it is inserted in the Manual it will be redrawn to present a right-hand instead of a left-hand aspect.

Report of Committee on Clearances

A. R. Wilson, Chairman*

Under Revision of the Manual, this committee offered a clearance diagram for railway bridges for adoption as recommended practice. The committee also presented a clearance diagram for girders projecting above the top of the rail, which was also offered for adoption and printing in the Manual as recommended practice.

In presenting this report, Mr. Wilson, explaining that the Mechanical section of the A. A. R. is considering the adoption of a maximum outline for cars, said that the committee desired to withdraw these recommendations and to submit the diagrams as a progress report.

The committee reported progress in the study of its remaining assignment—clearances as affected by half-through inter-track girders and structures, third rail, signal and train control equipment.

Uniform General Contract Forms

W. G. Nusz, Chairman†

In reporting on its six assignments, this committee presented for adoption one form of agreement, reported progress on two other assignments, and offered as information two forms of agreement. No revisions in Manual material were recommended.

Operation of Commissary and Boarding Outfits

Last year a tentative form of agreement to cover the operation of commissary and boarding outfits was submitted as information. This agreement has now been entirely rewritten and is submitted this year with the recommendation that it be approved for printing in the Manual. The agreement contains paragraphs on contractor's control, contractor's employees, camp equipment, maintenance of camp, abandonment of camps, charges against railway company employees, stocking commissaries, meals, alcoholic beverages and drugs, compliance with laws, fire inspection, liability and risk, bond, cost to employees, equipment, lamps, fuel and water, transportation, track cars, statement to railway company (by contractor), railway company's control, independent contractor, inspection, titles of articles and sections, and cancellation. This form was adopted.

Commercial Signs on Railway Property

In reporting on its assignment to develop a form of agreement for commercial signs on railway property, the committee stated that it has collected a large amount of data on this subject and presented a form as information. This form contains paragraphs on grant, display copy, permits and taxes, cost and maintenance, changes of structures, removal, rentals, liability, risk, term, and assignment.

Wire Line or Cable Crossings

One of the assignments of this committee is to prepare, in collaboration with the Electrical and the Telegraph and Telephone sections, a uniform contract and specification governing wire crossings, this work being undertaken at the request of the

Federal Rural Electrification Administration. As a result of the joint efforts of the different groups, three forms have been developed, namely, a form of application, a form of agreement and a scale of fees and rentals, which were submitted as information with the request that the members of the association bring them to the attention of their managements with the recommendation that they either be adopted as prepared, or that the principle represented therein be adopted and used in any agreements that are prepared.

In presenting the report on this subject, F. L. Nicholson (Nor. Sou.), chairman of the subcommittee, said that the committee had been in touch with the Rural Electrification Administration in regard to its subject, but had found that in many respects the views of this organization were not in accord with those of the committee. For instance, he said, the federal agency had been of the opinion that the property of the railroads could be used for wire crossings without charge. Turning to a discussion of the schedule of fees, he said that this scale applies particularly to certain eastern states and that it is not necessarily applicable to other sections. The important thing, he said, is that fees be charged for wire crossings.

G. S. Fanning (Erie) expressed the opinion that the forms and the scale of fees submitted by the committee should be adopted for inclusion in the Manual and made a motion to that effect, which carried.

Waterways and Harbors

G. P. Palmer, Chairman*

This committee reported progress in the study of four of its assignments and presented complete reports on three others, with one of which Manual material was offered.

Breakwaters, Bulkheads and Jetties

In reporting on breakwaters, bulkheads and jetties, the committee recommended that the following definitions of these terms be adopted for printing in the Manual:

Bulkhead—An engineering structure to prevent sliding of natural ground or fill material into the water; the limiting wall or structure along a waterfront.

Breakwater—An engineering structure to afford shelter from wave action.

Jetty—An engineering structure at the mouth of a river, at the entrance of a harbor or elsewhere, to control the water flow and currents, to maintain depth of channel, to protect harbor or beach.

Explaining that he considered it superfluous, O. E. Selby, (C. C. & St. L., retired), objected to the use of the word "engineering" in these definitions. In view of this and other objections to the definitions, the committee withdrew its recommendation that they be adopted for inclusion in the Manual.

In the remainder of its report, the committee dealt separately with breakwaters, bulkheads and jetties, discussing in each case the uses of the structure, and the various types of designs and construction. As local conditions play an important part in determining the proper usage of breakwaters, bulkheads and jetties, the committee does not feel that it is in a position to analyze the advantages and disadvantages of any types for these structures and accordingly made no recommendations as to practice. However, in its conclusions it made certain recommendations as to the method of procedure in dealing with government engineers regarding the construction of breakwaters, but offered no definite conclusions regarding bulkheads and jetties.

Warehouse, Coal, Car Float and Other Piers

In order to complete its assignment regarding warehouse piers, coal piers, car float piers and others on the Great Lakes and the seacoast, the committee confined its report this year to transfer bridges. Explaining that such bridges are of several types, namely, pontoon structures and electric bridges, the committee described each of these general types in detail, pointing out that electric bridges are of a new design, being considered more flexible and efficient than the older pontoon type for the handling of car floats.

Included in the report were excerpts from an unpublished report on the design and operation of American rail-water termi-

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† Assistant Engineer, Illinois Central.

* Engineer Maintenance and Construction, Baltimore & Ohio Chicago Terminal.

nals, which was compiled by the Committee on Yards and Terminals in 1931. These excerpts give pertinent information regarding 15 transfer bridges, 12 of which are located on the seacoast and 3 on lakes. In conclusion the committee expressed the opinion that "the design of transfer bridges and other facilities of similar nature depends on so many variables that each layout must be determined by local requirements and the type of traffic to be conveyed by them and that the structure must be planned to meet these conditions." This report was submitted as information.

Construction of Piers in Various Kinds of Water

In reporting on its assignment on the selection of the type of construction for piers in various kinds of water, including the materials used therein, the committee explained that it did not find any relationship between "type of construction of piers" and the "kind of water." Neither did it find any justification for the assumption that specific types of pier construction should or can be designated as most suitable for specific kinds of water.

After classifying the types of pier construction and the kinds of water, the committee pointed out that the type of pier construction generally depends not on the kind of water but on the depth of water and other factors. The materials used will depend on the same considerations, with the added factor presented by the possible presence of marine borers in salt water. In a discussion of this phase of the subject the committee pointed out that materials immune to borer attacks should be used in salt water below mean high water unless careful and extensive investigations show no likelihood of borers within the expected life of the structure. A brief discussion of the types of materials best suited to various parts of piers was also included. This report was submitted as information.

Report of Committee on Rail

John V. Neubert, Chairman*

This committee presented progress reports on seven of its eight assignments. Under Revision of the Manual it did not recommend any changes in Manual material but proposed a slight change in the tentative specifications for the controlled cooling of rails which were published as information in the 1939 Proceedings.

In addition to the recommendations published in the report, the committee recommended that the specification for nuts be amended so that the requirements for resulfured steel shall contain a provision that the minimum carbon content be changed to read 0.15. The purpose of this change was to bring the specification into conformity with the corresponding specification of the A. S. T. M. This recommendation was approved.

Research on Mill Practice and Manufacture

The committee presented a detailed progress report regarding its assignments to engage in further research of rail manufacture and to develop specifications for the thermal treatment of rail. It called attention to the fact that details regarding the work of the investigation from March, 1938, to March, 1939, are given in the fifth progress report which was presented at the 1939 convention. This year's report gives a general summary of the committee's work from December, 1938, to December, 1939.

Further study of the controlled cooling of rails has been made at a number of mills. In these studies it was found that the treatment of the molten metal with hydrogen gas failed to bring about the formation of shatter cracks in rails that were controlled cooled within certain limits of time and temperature. In this connection a study has been initiated of the possibility of preventing shatter cracks by holding the rail at a given temperature, and an investigation has been made in a number of steel mills of the actual variation in the rate of cooling among the individual rails in the cooling box.

The committee said that some preliminary work has been done in connection with the revision of the present tentative recommended practice for the controlled cooling of rails, but that further study seems necessary before the rather rigid requirements can safely be modified. It reported further that a study of the bend test as the acceptance test for rails had led to the belief that it seems to have several features of superiority

over the drop test that is now in use, and that the committee is giving attention to all fissure failures of rail that come to its notice.

The committee summarized the results of laboratory batter tests of end-hardened rails that have been carried out, and also described a field test of the same nature that is in progress on the Chesapeake & Ohio. It reported further that a study of the effect of gagging on the physical properties of rail steel is being made.

Regarding its work for 1940, the committee said that further studies will be made of the temperature limits for controlled-cooled rails and of bend tests of rails, that the laboratory and field batter tests of end-hardened rail will be continued, and that it intends to pursue a number of miscellaneous studies. Under the heading of "special report," the committee included a table summarizing data obtained from various railroads by means of a questionnaire, showing the results that have been obtained through the use of the all-ingot nick and break test.

Rail Failure Statistics

In accordance with past practice, a statistical report on rail failure statistics for 1938 was presented by W. C. Barnes, engineer of tests for the committee. The statistics included in this report were compiled in accordance with the standard method of basing the failure rates on mile-years of service in track. The report contained the usual analyses of rail failures by mills and a number of charts and tables showing the trend of failure rates. It is of interest to note that the 1933 rollings of rail, whose period of observation is now concluded, show an average rate of 73.5 failures per 100 track miles for the five-year period, which is an increase of 9.4 over the rate reported last year for the 1932 rollings.

Transverse Fissure Statistics

A report giving transverse fissure statistics was also presented by Mr. Barnes, which contained statistics that constitute a cumulative record of transverse fissure failures that have been reported up to and including December 31, 1938. The data included in the report are presented by means of a table showing transverse fissure failures on various roads by years, a chart showing the yearly trend of fissure failures, a table giving the accumulated fissure failures reported to December 31, 1938, by years rolled and by mills, and charts showing failure rates by mills.

According to the report, 5,293 service failures and 10,844 detected fissures occurred in 1938, as compared with 6,626 service failures and 11,161 detected fissures reported in 1937. The total of 16,137 fissures reported for 1938 represents a reduction of 1,650 as compared with 1937. Mr. Barnes pointed out that despite the large number of fissured rails detected and removed from track before service failures can occur, the number of service failures continues excessive.

Controlled Cooled and Brunorized Rail

A report on controlled-cooled and Brunorized rail was also presented by Mr. Barnes, which was in line with the committee's policy of accumulating data to assist in determining the performance of such rail. Included in this report is a table showing the tonnages of controlled-cooled and Brunorized rails that have been purchased by the roads represented on the Rail committee. According to this table, a total of 2,106,046 tons of controlled-cooled rail and 93,629 tons of Brunorized rail have been purchased by these roads.

Another table included with the report gives the number of different types of failures that have occurred in the rail shown in the tonnage table. Few failures of all types have occurred in this rail and no transverse fissures have been reported as occurring in controlled-cooled rails or in Brunorized rail since the latter process was modified on April 27, 1938.

In a brief report on the A. A. R. detector car leasing service, Mr. Barnes said that this service is in its eleventh year, and that the demand for it is so urgent that commitments are generally made six months to a year in advance of the testing. Unfortunately, he said, insufficient equipment is available for meeting all demands.

Cause and Prevention of Rail Battering

Reporting briefly on its assignment regarding the cause and prevention of rail battering, the committee said that it was

* Chief Engineer Maintenance of Way, New York Central.

continuing to co-operate in the rail investigation work at the University of Illinois in studying the prevention of rail-end batter by suitable heat treatment. It described the test installation that has been made on the Chesapeake & Ohio, and said that initial profile measurements of the joints and Brinell hardness readings had been made and that subsequent observations would be made periodically.

Economic Value of Different Sizes of Rail

In a brief statement regarding its assignment to determine the economic value of different sizes of rail, the committee said that efforts have been directed toward obtaining data from the various railroads on the relative costs of installing and maintaining rail of different sizes.

Continuous Welding of Rail

Reporting on the continuous welding of rails, the committee said that the general plans for the investigation, as outlined at the 1938 convention, are being carried out. Pointing out that the first progress report was presented last year, the committee said that the work has been continued by further tests made on rails welded by Process E (gas weld with pressure) and on rails welded by a slightly modified Thermit process. To secure a basis of comparison of the resistance of welded rail joints to repeated stresses to that of joint-bar joints, the committee said that a series of rolling load tests on rails connected by joint bars is in progress. Further, it proposes to supplement the laboratory investigation by a continuing record of the performance of welded joints in track.

Service Tests of Joint Bars

In connection with its assignment to make service tests of various types of joint bars, the committee submitted a progress report prepared by Dr. A. N. Talbot on the joint-bar test installations that have been made on the Atchison, Topeka & Santa Fe and the Pennsylvania. Dr. Talbot, under whose direction the tests are being carried out, described the different observational tests that are being made on the joints, which include measurements of the bolt tension, of rail surface ordinates and bar midordinates, and of the rail gaps. He discussed the results that have been obtained with the machine wrenching of bolts and said that the practice of making notes of general observations of the bars is being continued.

Brief mention was also made of differences that have been noted in the batter that has occurred in the end-hardened and non-hardened rails, of the use of Magnaflux inspection to determine if any cracks are present in the bars, and of the extent of the wear on the rails at intermediate points.

Investigation of Joint Bar Failures

Reporting on its assignment to investigate joint bar failures and to give consideration to the revision of designs and specifications, the committee said that responses to a questionnaire on the subject had been received from practically all of the major railroads in the United States and Canada. Based on the answers to the questionnaire, the committee presented a list of the general conclusions. It also offered a list of 21 suggested measures for reducing joint bar failures, and a list of 15 observations regarding the causes of such failures, the items in both lists having been obtained from the answers to the questionnaire.

The committee observed that it is quite obvious from the replies that, with two or three exceptions, the toeless design of bar is rendering satisfactory service from the standpoint of failures, and that it does not find any general necessity for changes in the design of the toeless bars or in the present standard specifications for joint bars.

Turning to a discussion of experimental work and research studies that are now under way on this subject, the committee described independent studies that are now in progress on the Chicago, Burlington & Quincy and the Denver & Rio Grande Western. It also said that it has contacted two manufacturing plants that have co-operated in certain studies and laboratory investigations. Under the heading of "general" the committee pointed out that consideration is being given to the desirability of relieving the pressure on the top of joint bars at the center by extending the end chamfer of the rails to the points of fishing contact—both head and base. From the standpoint of the installation of joint bars, it continued, there are two practical con-

siderations which merit individual observations by the railroads. One is the tendency of toeless bars to crack or lean out of alignment, while the second is the study of actual bolt tension by means of the extensometer.

Appended to the report was a considerable amount of tabular data giving information regarding the number of joint-bar failures on various roads.

The report was received without discussion.

Following the presentation of the report, Prof. H. F. Moore discussed the series of investigations that are in progress at the University of Illinois. He stated that a series of tests on the methods employed in the heat treatment of rails by controlled cooling indicate that to avoid shatter cracks it is not necessary that the rails be cooled below 300 deg. F., but that the time that the rails are allowed to remain in the cooling box to cool from 900 deg. is the controlling factor in determining the improvement in the quality of the rail metal.

As a part of the tests to determine the effects of slow cooling, a group of rails that had remained in a fully insulated cooling box for 12 hr. was removed when the rails had reached a temperature of 400 deg. They were then cooled quickly by being subjected to a blast of cold air and immersion in ice water, without developing shatter cracks. As a result of these tests, there has been considerable improvement in the process by more careful attention to insulating cooling boxes.

Professor Moore also stated that tests made in connection with the investigation of rail-end batter indicate that cold rolling by the wheels of passing trains tends to increase the toughness of both untreated and heat-treated rails.

Economics of Railway Labor

G. M. O'Rourke, Chairman*

This committee reported progress in the study of four assignments and presented complete reports on four others, including those on the analysis of operations of railways that have made marked progress in the reduction of labor required in maintenance of way work, the effect of modern equipment and machines on bridge gang organization and efficiency, labor economies which may be effected through revision of operating and maintenance of way and structures rules, and economies in labor resulting from the reduction in track patrol made possible through improvements in track conditions.

Reduction of Labor in Maintenance Work

The report of the committee on the analysis of operations of railways that have made marked progress in the reduction of labor in maintenance of way work, which was offered as information, was confined to a study of the track supervisor system in effect on the Chicago, Burlington & Quincy and the Chicago, Rock Island & Pacific. This system, said the committee, imposes track supervisors between the section foremen and their district roadmasters, giving the supervisors the primary responsibilities of direct supervision over the routine work of the track forces, relieving the section forces of the large amount of unproductive time formerly required of them in making daily track inspections, and providing the roadmaster with a direct representative among the section forces at all times.

The committee reviewed the development of the system on the Rock Island and the Burlington, and described the effect that it has had on the length of sections and roadmasters' territories. Next, it described how the system increases the productivity of section forces by relieving them of daily patrol activities, and gave details regarding the operation of the system and the duties of the supervisors. Turning to the question of the economies of the method, it pointed out that the indicated monthly savings on the Rock Island range from \$25,000 to \$30,000, and cited comparable figures for the Burlington. The following conclusions were offered by the committee:

(1) The track supervisor system enables the section forces to devote their full time to productive work, thereby increasing their output and effecting considerable economy in the forces necessary to maintain track to a given standard.

(2) It provides closer day-to-day supervision over and co-operation with the foreman, again contributing to increased production and promoting uniformity of work.

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(3) It provides means for training men in supervisory responsibilities and thereby fitting them for appointment as roadmasters.

(4) By relieving the district roadmaster of a large part of the direct supervision of his section foremen, he is permitted to devote more time to the larger special tasks, such as the supervision of rail gangs, the operation of work trains, etc. This has also made it possible to extend his territory.

(5) By reducing the number of section gangs, a corresponding reduction is effected in motor cars, section tool houses, etc., and in their maintenance.

Effect of Modern Equipment on Bridge Gangs

To obtain a basis for its report on the effect of modern equipment and machines on bridge gang organization and efficiency, the committee addressed inquiries to 59 roads, receiving returns from 51. Based on the replies to these inquiries, the committee compiled tables showing for each road the different units of equipment assigned to the various types of bridge gangs. It pointed out that there is a diversity of practices in effect regarding the use and assignment of work equipment for bridge gangs, and gave considerable attention to replies describing the use of motor trucks in bridge work.

Experiences of various roads were related regarding the manner in which modern equipment has influenced gang organization, after which excerpts from the replies of various roads were presented, showing the savings effected by different types of machines. The units of equipment named in this section of the report included paint spray outfits, highway trucks and trailers, and a wide variety of portable power-operated wood-working tools. Appended to the report were seven conclusions.

Labor Economies Effected Through Revision of Rules

In compiling its report on labor economies that may be effected through the revision of operating and maintenance of way and structure rules, the committee reviewed the rules in force on a number of roads and found that those covering flagging requirements and governing the operations of motor and track cars are substantially similar on different lines. It pointed out that it is the generally accepted practice to enforce such rules without distinction between heavy-traffic primary lines, and lighter traffic secondary and branch lines, and went on to explain the possible economies that could be expected by allowing certain exceptions in the enforcement of the rules on such lines.

In the latter connection the committee presented the results of an analysis that was made on eight representative roads. Among other studies, careful estimates were made of the unproductive man-hours reported by the maintenance forces, and it was found that 2.8 per cent of the total was used in observing the flagging rules and 2.6 per cent in observing the rules governing the operation of motor cars. As a result of its studies the committee feels that:

(a) Revisions of the more or less common and standard rules of maintenance of way and structures departments governing flagging and operation of track cars are not desirable.

(b) Certain economies in labor can be made by eliminating the unproductive time lost through compliance with these rules under all circumstances, and these savings can be achieved through the issuance of appropriate train orders or by special operating or time table instructions and furnishing interested maintenance forces with copies of such orders or instructions.

Track Patrol Economies Through Better Track

To develop information on its assignment to report on the economies in track-patrol labor resulting from improvements in track conditions the committee obtained complete data from 32 roads regarding the track patrol methods used; the information thus obtained was submitted with the report in the form of a tabulation.

In the text of its report, the committee reviewed the factors, such as heavier and better rail, that contribute to a possible reduction in track patrol, and pointed out that the use of track walkers has been decreasing since 1914. It traced the development of the motor-car patrols, and described variations of this method, including the track supervisor system. Figures were given showing the extent to which two-man motor-car patrols are in use, and a table was presented showing the frequency of track inspections on various roads.

In conclusion, the committee stated that (1) a study of the methods and amount of necessary work that is accomplished by a track patrol is well worth the time and effort, and (2) large economies in labor have been effected by a reduction in track patrol made possible by improved track and roadbed conditions. This report was offered as information.

The report as a whole was received without discussion.

Report of Committee on Ties

John Foley, Chairman*

This committee submitted reports as information on five of its seven assignments and presented a brief statement regarding another subject. No report was submitted on Revision of the Manual.

Extent of Adherence to Specifications

In its report on the extent to which specifications are being observed in the selection of ties, the committee reported on the condition of the seasoning and creosoted stocks on nine railroads, six in North Atlantic and three in South Atlantic States, that were examined by the committee during 1939. Regarding the eastern roads, the committee reported that the ties of three lines, as observed in two yards, were in a condition that left much to be desired and that the ties of all the eastern lines were in general poorly manufactured.

The committee pointed out that the southern road on which the ties showed the greatest deviation from standard requires its supervisors to assume responsibility for the inspection of the ties purchased, and commented on the contrast between the condition of the ties on this road and on two other southern roads "whose controlled inspection forces produce better and far more uniform results." It asserted that the general excellence of the ties accepted by five of the nine railroads whose stocks were observed confirms its conviction that "carelessness on the part of a railroad is the reason for any substandard ties in its stock."

Substitutes for Wood Ties

As its report on substitutes for wood ties, the committee presented as information a tabulation of test installations of such ties. In this table the substitute ties were listed alphabetically by name and such information was given as the name of the railroad, the location, the number of the ties and the year installed, the number removed, the maximum life secured and the kind of ballast.

Tie Renewal Averages and Costs

In accordance with its usual practice, the committee presented tables of tie renewals and costs, the figures submitted this year being for 1938 and the preceding five years. These tables, which were given advance publication in Bulletin 411, June-July, 1939, are based on data reported to the Interstate Commerce Commission by railroads in this country and to the association by Canadian carriers. The committee pointed out that comparisons between railroads are practicable only when allowances are made for certain variations in practice, and that differences in the prices at which ties are charged out are due not only to certain factors listed in the Proceedings but are affected also by whether or not the costs include expenses for such items as adzing, boring, incising or ironing any or all ties, freight on the shipment of the ties and the preservative to the treating plant, and inspection.

Seasoning of Oak Ties

In connection with its assignment regarding the proper seasoning of oak ties, the committee reported that during the last five years test stocks of ties have been under observation in seasoning yards of the Atchison, Topeka & Santa Fe; the Chicago, Rock Island & Pacific; the Erie; the Illinois Central; the Louisville & Nashville and the Missouri Pacific. It stated, however, that the results have proved so conflicting and contradictory as to make it clear that only very extensive tests, involving many thousands of ties, stocked in various ways in numerous places and subjected to frequent detailed measurements, would supply data from which detailed conclusions could

* Forester, Pennsylvania.

be shown. For these reasons the committee recommended that the subject be discontinued.

Dimensions of Ties

Reporting on its assignment to investigate the dimensions of ties, the committee first outlined information and conclusions contained in reports on this subject that were presented in 1924, 1932 and 1939. The committee then said that, in order to ascertain the nature of present practice regarding tie sizes and lengths, it had sent a questionnaire to each road named in the committee's tabulation of ties laid in replacement, requesting information regarding the approximate percentages of cross-tie sizes and lengths purchased. Data obtained through the questionnaire were given in a table submitted with the report. To determine weighted averages, the percentages given in the foregoing table were applied to the total 1938 tie insertions, and the figures thus obtained were given in another table.

In a discussion of the subject, the committee pointed out that a comparison of the tables with a tabulation compiled in 1924 indicates a trend towards larger ties. It added that a study of the two tables submitted this year indicates exceptions to the regional choice of length, pointing out that in the southern region the 8½-ft. length is used almost universally, while in the southwestern region the 8-ft. tie is used by all classes of roads. The committee said that the question may well be asked why the 9-ft. tie should not be adopted as standard, at least for heavy traffic, and called attention to the fact that the Santa Fe, located in 8-ft. territory, has recently adopted 9-ft. ties for about three-fourths of its requirements.

Splitting in Railroad Ties

The report of the committee on the cause and control of splitting in railroad ties consisted of a general discussion of the subject, which was submitted as information. First the committee discussed in some detail reasons for the shrinkage of wood, pointing out that this occurs when timber dries unevenly. Next, it considered briefly the manner in which splits occur in ties and described how such splits effect the service life of ties.

There followed a general discussion of the procedure necessary in seasoning ties to prevent splitting, and in this connection the committee said that the first step is to control the rate of drying. It said that in the air-seasoning of ties the important factors are temperature and humidity, that the proper circulation of air is of extreme importance in this connection, and that the method of stocking the ties is the controlling factor in providing proper circulation. Finally the committee pointed out that metal devices to hold the wood in place have been quite generally adopted by railroads in seeking a solution of the tie-splitting problem, and it described the various practices that are followed in applying such devices.

The report was received without discussion.

Complete Roadway and Track Structure

John E. Armstrong, Chairman*

This committee submitted reports containing recommendations regarding Manual material in regard to both of its assignments, one of which calls for a classification of railways while the other pertains to complete roadway and track structure for various loads and traffic densities.

Classification of Railways

In reporting on its assignment to develop a classification of railways the committee called attention to the fact that such a classification was submitted at the last convention as a progress report for discussion, criticism and suggestions. On the basis of comments received during the year, the classification has been clarified in certain respects and was submitted again this year with the recommendation that it be adopted for inclusion in the Manual.

The classification divides main tracks into three classes (A, B and C) on the basis of three factors, namely, (1) the total annual tonnage carried, (2) the average speeds of freight trains, and (3) the average speeds of passenger trains. Appended to the

*Chief Engineer, Canadian Pacific

classification was an explanatory note which was included in the material recommended for inclusion in the Manual.

These recommendations were approved.

Complete Roadway and Track Structure

At the 1939 convention, the committee submitted as a progress report a tentative schedule of classes of complete roadway and track structure. Comments received during the year regarding this schedule have been given consideration, and the schedule, which contains three classes of track structure to conform to the traffic classification of main tracks mentioned above, was presented again this year. The committee explained that the three classes of complete roadway and track structure must not be regarded as being definitely fixed and mutually exclusive as to details, and outlined various local conditions under which it might be desirable to deviate from the schedule. Contingent on acceptance of the traffic classification of main tracks, the committee recommended that the schedule of classes of complete roadway and track structure be received as information and that a reference to its location in the proceedings be printed in the Manual immediately following the classification of main tracks.

This recommendation was approved.

Wood Preservation

C. F. Ford, Chairman*

This committee reported progress in the study of four of its eight subjects and presented progress reports on the other four, namely, service test records for treated ties, piling used for marine construction, destruction by termites and possible ways of prevention, and present practice as to preservatives used.

Service Test Records of Treated Ties

Following its accustomed practice, the committee submitted the usual table showing tie renewals per mile of maintained track for various railroads which had been revised to include figures for 1939. Data was also included in the report covering special tie tests on the Atchison, Topeka & Santa Fe; the Canadian National; the Canadian Pacific; the Chicago, Burlington & Quincy; the Chicago & Eastern Illinois; the Chicago, Milwaukee, St. Paul & Pacific; the Chicago, Indianapolis & Louisville; the Great Northern; the Northern Pacific and the Union Pacific.

Piles Used for Marine Construction

The committee's report on piles used for marine construction consisted for the most part as in past years, of information pertaining to the condition of various test installations for determining the extent of teredo infestation at various locations, which are under observation by itself, the Chemical Warfare Service, the Panama Canal Zone, the New England Marine Piling committee and other collaborators. The committee reported briefly for the first time on the investigation now under way in New York harbor, 33 test boards having been established at that location in March, 1938.

Destruction by Termites and Ways of Prevention

In its report on destruction by termites and possible ways of prevention, the committee submitted a brief description of the second series of test posts that was installed at Florissant, Mo., in May, 1939. These posts involve the use of both soil poisons and pressure treatment. The committee explained that, in installing the posts in this test, a different method of arrangement was adapted in which the treated and untreated pieces were scattered over the field instead of being segregated from each other. Appended to the report was a list of all the compounds that were prepared and used in the test installation.

Present Practice as to Preservatives Used

The report of the committee on present practices as to preservatives used was comprised, in accordance with usual practice, of a tabulation summarizing the practices, as of March 1, 1938, of various railroads regarding the types of preservatives and preservative treatments used for treating timber for different purposes. Also included with the report was a tabulation summarizing the extent to which coal tar creosote and its various

* Supervisor Tie and Timber Department, Chicago, Rock Island & Pacific.

mixtures are used in treating the different timbers. The report was accepted without discussion.

Report on Track

W. G. Arn, Chairman*

This committee presented reports on 11 of its 14 assignments. Recommendations regarding Manual material were offered in connection with five of these reports, while six were presented as information. The committee reported progress in the study of its three other assignments.

Revision of Manual

Under Revision of the Manual the committee made numerous recommendations, the more important of which are as follows: Under the heading, Specifications for the Laying of New Track, delete reference to the 1923 Proceedings and insert the specifications now shown in the 1929 Manual; delete nearly all of the matter under the heading, Maintenance of Line, except that regarding permanent monuments; change the heading, Maintenance of Surface, to read, Elevations and Speeds for Curves, and add under this heading certain new material; replace the table entitled Speeds of Trains Through Curves with a new table entitled Elevations and Speeds for Curves; and delete certain other material now appearing under the heading, Maintenance of Surface.

In place of the new material submitted by the committee under the heading, Elevations and Speeds for Curves, and the table, O. E. Selby (C. C. C. & St. L., retired) presented substitute material which he moved for adoption. However, after considerable discussion, this motion was voted down and all of the committee's recommendations were adopted.

The committee also recommended numerous revisions in the material dealing with the stringlining of curves by the chord method. The most extensive of the proposed revisions involved the substitution of new material for much of the matter explaining the application of the method in an example.

These revisions were approved without comment.

Fastenings for Continuous Welding of Rail

In connection with its assignment to report on fastenings for the continuous welding of rail, the committee pointed out that its work in this respect has consisted of the inspection of installations of continuous rail with various types of fastenings and the compilation of periodical reports on the service performance of the fastenings. However, no inspections were made in 1939, and, since last year's report included reference to all installations studied, no service reports were presented this year.

Plans and Specifications for Track Tools

In reporting on plans and specifications for track tools, the committee pointed out that plans for certain tools had been offered as information in 1938 to invite comment and criticism. These were designated as plans No. 20A—Wood Center Track Gage, No. 27—Track Level and Elevation Gage, No. 28—26-in. Scythe, No. 29—Snath, and No. 30—Spot Board. Pointing out that some of these plans have since been subjected to extensive revision, the committee presented them again with this year's report and recommended that they be accepted as recommended practice and printed in the Manual.

The committee also recommended that the plan for timber tongs, designated as Plan No. 8A, that was offered as information in 1938, be accepted as recommended practice and printed in the Manual as Plan No. 8-40, and that the present plan be withdrawn.

In addition, the committee proposed the acceptance as recommended practice of the physical test for timber tongs that was submitted as information in 1939. This test is as follows:

Three pairs of tongs to be tested from each lot of 10 dozen or less by suspending a load of 300 lb. to 400 lb. workwise in the tongs with the handles in a horizontal position and supported at a point 2 in. from the end. Deflection with 300-lb. weight shall not exceed 1 in., with no permanent set, and with 400-lb. weight deflection shall not exceed 1¼ in. and with a permanent set of not to exceed ⅓ in.

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When presenting this report W. L. Roller (C. & O.), chairman of the sub-committee, said that, in view of certain criticisms of Plan No. 20A that had been received, the committee desired to withdraw this plan as recommended Manual material and to submit it as information. The other recommendations of the committee were adopted without comment.

Plans for Switches, Frogs and Crossings

Regarding its assignment pertaining to the development of plans for special trackwork, the committee said that during the past year it had undertaken a review of all the drawings that have been printed as recommended practice in the portfolio of Trackwork Plans. This review, it said, has indicated that, before being reprinted, practically all of the plans will require more or less revision. However, as facilities have not been available to revise all the plans during one year, the committee submitted key plans of the various types and classes of material, with the recommendation that they be adopted as recommended practice and that the corresponding plans now appearing in the Manual be withdrawn. It explained that if these plans are approved the revision of the remaining plans will be undertaken during the coming year.

All the plans submitted by the committee were adopted.

Corrosion of Rails and Fastenings in Tunnels

The committee stated that during the past year it had continued its study of methods for eliminating the corrosion of rails and fastenings in tunnels. It pointed out that the protection of the running surface of the rail from corrosion is the most important problem and that the average corrosion penetration found to date has been 0.015 in. per year. Two methods were described that are being used to measure the rate of corrosion in the Moffat tunnel, one of which involves the use of a rail profile machine and the other an Ames dial.

Also, the committee listed and described four possible methods that have been investigated for eliminating corrosion. These are as follows: Treatment of locomotive coal to neutralize stack gases; protective coatings for the rail and fastenings; the use of special alloy materials; and the application of a metal spray to the sides of the rail head. This was offered as a progress report.

Design of Tie Plates for RE Section Rails

As its report on the design of tie plates for RE rail sections, the committee presented specifications for hot-worked, high-carbon steel tie plates, which were offered for adoption as recommended practice and printing in the Manual. These specifications contain sections on manufacture, chemical properties and tests, physical properties and tests, workmanship and finish, marking, and inspections and rejection. They were adopted without comment.

Welding of Manganese Castings in Special Trackwork

After a study of all the available data on the welding of manganese castings in special trackwork, the committee decided that a research program was necessary in order to improve the technique of manganese welding and to determine the relative merits of coated electrodes and the advantages and disadvantages of nickel-manganese and other alloy-manganese base metals for castings.

After outlining the scope of the research program, the committee stated that it proposes to establish a "proving ground" where the different welding techniques and materials will be compared under identical traffic conditions, the welding tests to be supplemented by such laboratory work as may be found necessary. Through the assistance of the frog and switch manufacturers, the committee has obtained 24 special manganese test castings which have been assembled into three units and installed in one of the heavy-traffic freight tracks of the Chicago, Milwaukee, St. Paul & Pacific near Mannheim, Ill.

Bolt Tension for Proper Support of Joints

In regard to its assignment to investigate the bolt tension necessary for the proper support of joints, the committee reported that it had made measurements at intervals during the year of bolt tension in the test installations that have been established on the Chicago, Burlington & Quincy, the Chicago, Milwaukee, St. Paul & Pacific; and the Denver & Rio Grande Western. These

test installations were described in the report of the committee on this subject that was presented last year.

In this year's report, the committee presented the results of the bolt-tension tests that have been made at the test installations during the past year. In the case of each of the installations, the committee discussed the uniformity of the bolt tension that was obtained in tightening the bolts, gave figures to show the loss of bolt tension under traffic that occurred at each installation, and also presented data showing the changes that have occurred in the joint gap openings at the different locations. In regard to the Burlington test installation, the committee described a specially-designed hand wrench with a friction release that was used for tightening the bolts. It also made a comparison between the actual change in length of a piece of rail and the calculated or theoretical change in length of an equivalent piece of rail free of any restraint to its expansion movement.

The report on the Milwaukee installation included the results of tests made to determine the uniformity of the tension produced in the track bolts by two different types of power nut runners. The committee also described two new bolt test installations that were made during 1939, one of these being located on the Erie near Griffith, Ind., and the other on the Pennsylvania near Birmingham, Pa.

Prevention of Drainage Due to Brine Drippings

One of the assignments of this committee is to investigate methods of preventing damage to the track structure due to brine drippings. In its report, the committee said that a meeting had been held to discuss the results of laboratory tests made to date in the study of corrosion from brine drippings and to decide upon a plan for continuing the research work on this matter. As the result of this meeting a definite procedure was decided on for continuing the research work and much of the report of the committee was devoted to a description of this procedure. The instructions for making the tests include a description of the specimens to be used and their method of manufacture, and directions regarding the test apparatus and procedure, the corrodants and inhibitors to be tested, the numbering of the test specimens, the duration of the test, the weighing of the specimens, and the reporting of the results.

During the year, tests have been conducted in accordance with the committee's procedure on the Chicago, Milwaukee, St. Paul & Pacific, the Denver & Rio Grande Western, the Atchison, Topeka & Santa Fe and the Chesapeake & Ohio. The results of the tests on these roads were presented with the report in tabular form, and in its conclusions the committee stated, among other things, that the results of the laboratory tests consistently indicate that the best performance may be expected from the use of sodium dichromate and soda ash as an inhibitor.

Specifications for Laying Rails

The committee's report on its assignment to develop specifications for laying rails consisted of a set of such specifications which were offered as information and for consideration as Manual material in 1941. Included in the specifications was a list of the several classes of rail, which includes recommendations regarding the type of track that the different classes of rail are suitable for. Instructions are given in the specifications for unloading rail, for preparing the track, for laying rail and for completing the work.

Spirals for High-Speed Operation

During the past year the question of spirals for high-speed operation was subjected to further study by this committee in collaboration with the Committee on Economics of Railway Location and Operation. As the result of this study, it was decided that the present material in the Manual, which was adopted in 1911, was in need of considerable revision, and recommendations regarding the desired changes were incorporated in the committee's report.

Included in the recommended material was a list of notations in which were incorporated a number of changes as compared with the present Manual material. As new material, a list of known quantities and factors was submitted, which was followed by a revised list of formulas for the exact determination of the functions of the 10-chord spiral when the central angle does not exceed 45 deg. and of a list of empirical formulas for field use. The new material offered included a tabulation of the errors that

might be expected in the application of the empirical formulas. The committee also recommended the deletion of part of the instructions in the Manual regarding the staking of spirals by deflection and the substitution of revised material.

G. F. Hand (N. Y. N. H. & H.) inquired if the material submitted by the committee was applicable in situations where the tangents are fixed and it is not permissible to move the center of the curve. Replying, C. W. Baldrige (A. T. & S. F.), chairman of the subcommittee, said that, in his opinion, the new material provided for such situations at least as well as that now in the Manual. F. W. Droste (C. & O.), wanted to know if the committee had given consideration to using the symbols that are in common use in text books when making its revisions in notations. Mr. Baldrige replied that the committee's recommendations involve only a few suggested revisions in notations, and that he considered these to be desirable. All the committee's recommendations were then adopted without further comment.

Roadway and Ballast

A. E. Bolts, Chairman*

This committee presented reports on eight of its twelve assignments, three of which contained recommendations regarding Manual material. Progress was reported in the study of the committee's four other assignments.

Natural Waterways

The committee's report on natural waterways, submitted as information, consisted of a discussion of the principles involved in determining the run-off from drainage areas. Practically all the formulas in use today have been set forth in previous reports of this committee; hence in the present report the committee confined its attention to the basic principles from which most of these formulas have evolved. After analyzing the development of a basic formula, the committee discussed briefly the importance of using the proper coefficient and also the importance of the time element or periodic expectancy of flood flows. Two charts were included, one of which consists of a graphical tabulation of flood run-off records and their relation to suggested run-off formulas, while the other illustrates in a comparative manner the results produced by different formulas giving the relationship between drainage areas and flood run-off. The following conclusions were presented:

Runoff formulas for determining the required sizes of waterway openings, although not recommended, may be used where structures of low cost and minor importance are involved, and when the formula is applied with an appreciation of its limitations, its use is intended only as a guide, and the results are to be modified as other known data and experience seem to demand.

Culverts

In its report on culverts the committee pointed out that last year it called attention to a specification of the A. S. T. M. for "double strength" vitrified clay pipe. Since the inherent strength of this pipe is not great enough for the loads imposed in many locations, the committee reported that the industry has developed and is now producing a much heavier pipe known as "triple strength" or "culvert" pipe.

Although the A. S. T. M. is working on a specification for this pipe it was not expected that it would become available for some time; for this reason the committee deemed it advisable to proceed independently in the development of a specification. This has been done and the specification was offered this year for the purpose of inviting criticisms and suggestions, with the thought of submitting it next year for inclusion in the Manual. Contained in the specification are instructions for making tests on the pipe for resistance to acids, and for crushing strength and absorption. It also discusses sizes, dimensions and permissible variations, workmanship and finish and marking, inspection and rejection.

Formation of the Roadway

One of the assignments of this committee is to report on formation of the roadway, particularly as regards settlement, shrinkage and subsidence. The report on this subject consisted of a general discussion of these factors and of methods of overcoming them. Regarding shrinkage, the report pointed out that

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modern methods of grading, involving heavy mechanized equipment, result in effective consolidation of embankment material so that generally no vertical allowance need be made for shrinkage.

With regard to embankments that are formed by dumping material from bridges and trestles, the committee said that clay and loam that are placed in this manner should be spread in layers with adequate compaction of each layer. If the material contains enough clay to permit compaction, it stated that future shrinkage can be practically eliminated by the use of rollers, combined with sprinkling when this is required to give the proper moisture content.

In discussing subsidence, the committee pointed out that trouble of this nature usually occurs in railroad embankments because of the compression or lateral displacement of the underlying material. The nature of these phenomena were considered briefly, after which the committee discussed the use of "corduroy" as a means of preventing subsidence, pointing out that various factors have combined to make this expedient obsolete for railroads.

In building fills on soft ground, said the committee, the problem is to determine how they can be brought to rest most quickly and economically on a firm foundation. Methods for making surveys of the foundation material were then considered briefly, after which the committee discussed methods of accelerating subsidence, which include the use of explosives, jetting, and removal of the soft material. Attention was also given to the problem of stabilizing fills that continue to settle year after year because of subsidence. Four conclusions were presented with the report and a bibliography of written material pertaining to the subject was also included.

Slope Protection

As the outcome of a study of new information on the subject of slope protection, the committee recommended the deletion of present Manual material pertaining to this subject and the substitution therefor of paragraphs giving instructions for protecting slopes by formation, vegetation, surface blanketing and detector fences. This material was adopted without discussion.

Tunnels, Particularly Lighting

In reporting on the lighting of tunnels, the committee gave the results of an investigation that was made to determine the extent to which tunnels are illuminated by daylight from the portals a sufficient amount to permit work to proceed satisfactorily. This investigation shows that the distance is 200 ft. in single-track tunnels on tangent, 300 ft. in double-track tunnels on tangent, and 125 ft. in a single-track tunnel on a 10-deg. curve.

To develop information regarding methods of lighting tunnels artificially, the committee sent a questionnaire to 14 railroads. Replies were received from all these roads covering a total of 941 tunnels with an aggregate length of 196.54 miles. Information obtained by means of the questionnaire was given in some detail and in this connection the committee pointed out that there are many different types of wiring and lighting arrangements in use.

It stated that of the total number of tunnels reported, 875, with a length of 146 miles, are lighted by various means other than electricity. It noted that there seems to be some differences in opinion regarding the efficacy of non-electric means of lighting tunnels, and that the replies were almost unanimous in the thought that lighting units that can be moved about are better than lights in a fixed position. Where electric current is available at a reasonable cost, the replies were about equally divided as to whether permanent electric wire circuits should be installed or the light supplied by portable electric generating plants that can be moved from tunnel to tunnel as required. This report was offered as information.

Fences

With regard to its assignment pertaining to corrosion-resisting fence wire, the committee reported that it is collaborating with an A. S. T. M. committee which is conducting exposure tests of various types of wire fencing in locations that are considered representative of atmospheric conditions encountered in the service use of this material. In describing the tests, the committee listed the types and sizes of wire involved, the num-

ber of samples of each, and the weights of the coatings, and pointed out that portions of the samples are placed at 11 locations between Bridgeport, Conn., and Santa Cruz, Cal. It said that the samples were tested for various properties prior to their installation and that they are being tested periodically.

Ballast Section Design

In reporting on ballast section design, the committee offered for adoption and inclusion in the Manual two ballast section plans for curves with super-elevations up to and including three inches. These sections are designated as Ballast Sections No. 3—Curves, and No. 4—Curves, and are for use with prepared gravel having less than 20 per cent of crushed particles and with pit run gravel. They were adopted without comment.

Use of Asphalt in Ballast

One of the committee's assignments was to investigate the use of asphalt in ballast and as its report on this subject the committee described an experimental installation of such ballast on the New York Central. This test section is 600 ft. long and is located in the eastbound high-speed track at the station platform at Bryan, Ohio. The work of making this installation involved the renewal of all the crossties, the application of new double-shoulder tie plates and new angle bars, removal of all the old ballast to a depth of 8 in. below the ties, and the application of new stone ballast coated with emulsified asphalt. Two lifts were made and after the final lift cross drains consisting of old 5½-in. flue pipe were installed.

A 2-in. seal coat, consisting of a mixture of ¾-in. stone and emulsified asphalt, was applied to the new ballast, and this coating in turn was covered with a mixture of sharp wet sand and emulsified asphalt, which was thoroughly broomed into the voids. The finished surface is about one inch below the top of the ties at the center of the track and slopes to about three inches below this level at the ends of the ties. The report was accompanied by a number of photographs and drawings.

After presenting the report on this subject, J. M. Podmore (N. Y. C.) explained that the experimental installation has now been in service five months and that the track has remained in good line and surface. Furthermore, he said, there has been an entire absence of heaving in the experimental section, although this phenomenon has been in evidence in conventional track in the immediate vicinity. He said that at a highway crossing within the limits of the section the track with the ballast treated with asphalt remained undisturbed, but that other tracks at the crossing have had to be shimmed.

Revision of Manual

Under Revision of the Manual the committee recommended two minor editorial changes in the specifications for formation of the roadway. Explaining that embankment is seldom placed in layers of more than 12 in., the committee recommended that, in Section 33 of the specifications, the term "inches" be employed to designate the thickness of the layers instead of "feet" as at present. In Section 34, which deals with compaction of the embankment, the committee recommended that the word "self-propelled" be omitted from the description of the type of roller to be used. The reason for this change is to permit the use of tractor-drawn rollers such as those of the sheep's-foot type.

All of these recommendations were approved without discussion.

Stresses in Railroad Track

Dr. A. N. Talbot, Chairman*

The report of this committee consisted of a discussion of the progress that has been made in carrying out the various research projects that this committee has under way in co-operation with the American Society of Civil Engineers and the Association of American Railroads. After reviewing briefly the report that was presented at the 1939 convention, the committee described a series of tests that were carried out during 1939 on the Pennsylvania for the purpose of obtaining information on various factors influencing the action of locomotives under slipping conditions. These tests involved the use of eight types of locomotives, and the records taken included stresses and depression at

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several track locations, stresses in the locomotive side rods, and movements of the driving wheels with respect to the frame.

Turning to a brief discussion of the service tests of joint bars, the committee said that, as reported by the Committee on Rail, observational tests have been continued on the experimental installations on the Santa Fe and the Pennsylvania. It also reported that various laboratory tests have been made during the year, and that of particular interest and importance in this connection are a series of tests of rail joints that have been made with the rolling-load testing machine. The committee said that a thorough study and survey of electrical strain measuring equipment and its design were made during the year and orders placed for such gages, bridge circuits, amplifiers and auxiliary apparatus as will be complimentary to the six-element oscillograph that was purchased last year.

In presenting the report, Dr. Talbot supplemented the written matter with a detailed discussion, illustrated by slides, of the various research projects that the committee has under way. Referring to the test installations of joint bars, he commented at length on the results of rail surface, profile and other measurements that have been made of these joints. Turning to a discussion of butt-welded rails, he reported on the condition of such installations on the Delaware & Hudson and the Bessemer & Lake Erie, and presented a slide containing curves showing temperature stresses in the rails at one end of a section of butt-welded track. He pointed out that these curves showed that such stresses at the same temperature have shown a high degree of uniformity over a period of years. He reported that a break had occurred in a butt-welded rail on the B. & L. E. when the temperature was 8 deg. above zero but that the rails separated only $\frac{1}{4}$ in.

Dr. Talbot then described the characteristics of the equipment that is being used for making rolling load tests of rail joints, and gave the results of these tests. In most cases, he said, the failures in joint bars that have occurred in these tests have been due to fatigue cracks in the lower portions of the bars. A chart was presented showing the cycles of the rolling load machine that were required to bring about the failure of joints of different characteristics.

Dr. Talbot described the results of measurements that had been made to determine the stresses set up in rails due to flat spots on wheels, and exhibited a slide showing that such stresses are considerably larger than those developed by round wheels. In conclusion, he discussed briefly measurements that had been made to determine the stresses in rails that are caused by battered joints.

Water Service, Fire Protection and Sanitation

B. W. DeGeer, Chairman*

In reporting on its nine assignments, this committee presented progress reports on two subjects, including revision of the Manual, reported progress in the study of two others, and presented final reports as information on five assignments. The latter included reports on conditioning water for vapor heating boilers on Diesel-powered trains; new types of pipe and their application to railroad water service; methods for rejuvenating deep wells; fire extinguishers—their types and uses; and the use and application of chemicals for preventing deposits in pipe lines.

Revision of Manual

Pointing out that the present specifications in the Manual covering material to be used for tank hoops refers to wrought iron and that this material costs considerably more than steel, the committee said that there is no good reason why tank hoops conforming to the specifications adopted for bridge steel should not be satisfactory. It, therefore, recommended that the following be substituted for the matter in the Manual on tank hoops that appears under the heading of Material:

"Tank hoops shall be made of steel conforming to all of the requirements for quality, strength, inspection and test given in A. S. T. M. specifications for bridge steel A7-36."

The committee also recommended that, in order to conform with actual procedure, the third sentence under Section (b)

Procedure, of the material in the Manual on the analysis of hydrated line, which reads, "Dilute to the mark and shake thoroughly for approximately 5 minutes," should be revised to read as follows: "Make up to the mark with 10 per cent sugar solution and shake thoroughly for approximately 5 minutes."

These recommendations were approved.

Pitting and Corrosion of Boiler Tubes and Sheets

The report of the committee on the cause of and remedy for pitting and corrosion of locomotive boiler tubes and sheets consisted of a presentation of current knowledge regarding intercrystalline corrosion in the rivet seams of locomotive boilers. Pointing out that recently it has been estimated that this type of corrosion results in a loss of some \$500,000 per year on American railroads, the committee stated that the problem is being subjected to intensive investigation by various agencies.

In describing the character of the changes that take place in steel when intercrystalline corrosion occurs, the committee said that "as a very crude illustration the action might be likened to removal of the mortar from between the bricks in a wall to allow the structure to collapse." Next, the committee undertook a discussion of the causes of intercrystalline corrosion and concluded that this phenomenon is due to a combination of factors as follows: (1) An embrittling water; (2) high stresses in the metal, which may result either from cold working or from externally-applied forces; (3) the formation of a film of concentrated solution as a result of slow leakage; and (4) contact of the film of concentrated solution with the boiler metal in the region of high stress. A brief description is included in the report of a device that has been developed for determining the embrittlement action of boiler water.

In discussing methods of preventing embrittlement, the committee stated that it should be possible to accomplish this end by eliminating any one of the four factors listed, but added that, on locomotives already built and in service, the simplest and least expensive remedy seems to be water treatment. The use of sodium sulfate as a means of preventing embrittlement is given consideration, but it is pointed out that plant and laboratory tests with the embrittlement detector have not confirmed the belief that this chemical is effective for the purpose.

However, the committee pointed out that the search for a material in the field of organic chemicals has met with some degree of success, and went on to say that the use of lignin-containing materials, such as sulfite liquor, have proved effective. Quebracho, another organic compound, has been found suitable in the laboratory for preventing intercrystalline cracking within a certain pressure range, but it is pointed out that this chemical is probably too expensive for use in locomotives. This report was presented as information.

Vapor Heating Boilers on Diesel-Powered Trains

In reporting on the conditioning of water for vapor-heating boilers on Diesel-powered trains, the committee noted that the water used in such boilers must be treated to prevent scale formation, pitting and corrosion. Following a brief description of the vapor-heating boiler, the committee pointed out that water for use in such boilers may be conditioned by any one of three methods, as follows: (1) Proprietary compounds; (2) condensate; and (3) exchange filters. Each of these methods is then treated separately, with the exchange filter being described in some detail.

Such filters, said the committee, usually consist of three separate units connected in series. The first two are filter beds, the first of which is known as the cation exchanger and removes the positive ions such as those of calcium, magnesium and sodium. The second bed removes the negative ions, or anions, such as the chlorides, sulfates and nitrates, and is known as the anion exchanger bed. The carbonate ions are released by aeration through a unit known as a "decarbonator." Typical figures in the cost of treating water by the exchanger process are included.

Where the raw water is low in chlorides and sulfates, the committee pointed out that the use of carbonaceous zeolites in combination with sodium zeolites offers another means of treating feedwater. The operation of the carbonaceous zeolite is the same as for the cation exchanger, and when it is used with the sodium zeolite, the effluents are combined in correct proportions to obtain a feedwater that is free from hardness, low in dis-

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solved solids and of desired alkalinity. This report was submitted as information. The report was accepted without discussion.

New Types of Pipe

The report of the committee on new types of pipe coming into use and their application to railroad service included brief discussions of cast iron pipe, coated and lined thin-wall steel pipe, cement-asbestos pipe, and copper tubing. Reference was made to the development of the centrifugal process for casting iron pipe and the advantages of pipe manufactured by this process were described. New type linings that render cast iron pipe more resistant to tuberculation were also described.

In discussing thin-wall steel pipe, the committee said that during the last 10 years such pipe with wall thicknesses about one-half those of standard-weight steel pipe has been used to some extent in water-works installations. It pointed out that the development of the bituminous enamel spun lining and outside coating for steel pipe gives promise of having supplied the solution for the protection of such pipe against corrosion. After describing and reviewing the development of cement-asbestos pipe, the committee pointed out that in first cost and in the cost of making joints, there is some advantage in cement-asbestos pipe over cast iron pipe. On the basis of an estimated service life of 65 years for cement-asbestos pipe, the annual cost would be approximately the same as for cast iron pipe with a service life of 100 years.

In regard to copper tubing, the committee pointed out that the use of this material in small diameters for inside water piping and outside service lines had come into prominence. In first cost this pipe is slightly higher than galvanized pipe, but because of its flexibility and the simplicity of making sweat lead joints, its use has increased to a considerable extent. This report was offered as information.

Methods of Rejuvenating Deep Wells

At the outset of its report on methods for rejuvenating deep wells, which was offered as information, the committee pointed out that the methods used for this purpose will vary according to circumstances or the particular condition of the well to be improved, and that the application of the method may vary in different kinds of water-bearing formations and with local conditions. It observed that the redeveloping of wells generally requires agitation, and went on to describe the various means of achieving this end, which include the starting and stopping of the pump at short intervals for a period of time, the use of plungers, and the application of hydrochloric acid, dry ice or hypochlorite solution. Reference was also made to the use of low-pressure steam or the air lift principle.

The committee then described instances in which these methods have been used in the cleaning of wells on the Illinois Central, the Atchison, Topeka & Santa Fe, the Northern Pacific, and the Erie, describing in each case the extent of the improvement in the flow that took place. In addition, the experience of the Missouri Pacific with the use of detonators or dynamite caps as a means of increasing the flow from wells was also described.

Turning to a discussion of wells in rock formations, the committee first described the precautions that should be taken when installing such wells to insure satisfactory service. Next, it explained the various measures that may be employed to restore production in such wells, which include the use of drilling tools for breaking up debris in the well, and of chemicals and mechanical air agitation for removing obstructions. In difficult cases, high explosives are sometimes used.

Appended to the report were five conclusions embodying the views of the committee regarding the methods to be used in reconditioning wells.

Fire Extinguishers—Their Types and Uses

In reporting on fire extinguishers—their types and uses, the committee pointed out that for all practical purposes fires can be divided into three general classes, as follows: Class A—fires in ordinary combustibles such as wood, paper, textiles, rubbish, etc.; Class B—fires involving inflammable liquids, greases, etc.; and Class C—fires in electrical equipment. The committee noted that there are extinguishers best suited for putting out each particular class of fire. The appliances most adaptable for putting out Class A fires are the soda-acid, foam, calcium chloride

(non-freezing), loaded-stream and pump-tank extinguishers and water pails and hand hose.

For putting out Class B fires, the committee listed the foam, loaded-stream vaporizing liquid (carbon tetrachloride base), carbon dioxide, and dry-chemical extinguishers and sand pails as being the most adaptable. The vaporizing liquid, carbon dioxide and dry-chemical extinguishers were listed as offering a non-conducting extinguishing agent that can be safely used in putting out Class C fires.

Following a brief discussion of the distribution of extinguishers, the committee undertook to describe briefly each of the types of extinguishers listed, discussing in each case the method of operation, the suitability for various fires and the unit of installation. Attention was also given to foam generators and wheeled extinguishers; after which the committee discussed the recharging and inspection of extinguishers. Calcium chloride was recommended for making non-freezing solutions, and a table was included showing the temperatures at which various solutions of calcium chloride will freeze. The report was offered as information.

Chemicals for Preventing Deposits in Pipe Lines

In its report on the use and application of chemicals for preventing deposits in pipe lines, the committee noted that such deposits may occur from raw water, completely treated water or internally treated water. It stated that most of the deposits from raw water or railroads are found where the calcium content of the water is high, where the suspended matter is high, or when the water contains large amounts of manganese. Also, certain micro-organisms, such as crenothrix, may cause troublesome deposits.

In discussing methods of coping with such deposits, the committee pointed out that, since the publication of a previous report on this subject, a new class of substances, known as molecularly dehydrated phosphates, has been applied to the problem, and the use of tannin extracts has been extended. The formation of molecularly dehydrated phosphates was described and the use of a particular form (sodium hexametaphosphate) as being most adaptable to railroad service was discussed in some detail. It was stated that the amount of this material that should be used varies between one and five parts per million.

It was pointed out that extracts of the tannin type are probably the most widely used of the substances inhibiting incrustation in pipe lines. The dosages of this material, which depend on various factors, will vary between 1 lb. per 4,000 gal. and 1 lb. per 8,000 gal. of internally treated water, and between 1 lb. per 10,000 gal. and 1 lb. per 15,000 gal. of completely treated water. The committee concluded that it is usually possible and generally more economical to prevent incrustation chemically than to clean or renew pipe lines, that in completely treated water incrustation troubles may usually be reduced materially through the use of a coagulant to produce a water low in residual hardness, that it may be advantageous to use a molecularly dehydrated phosphate or tannin extract, and that the nature of the substance to be used and of the charge required will vary with local conditions.

Report on Buildings

L. H. Laffoley, Chairman*

This committee presented a number of revisions for the Manual and complete reports on drinking-water facilities in railway buildings, and on drop pits, jacks and tables, the report on the former subject being offered as information and that on the latter for publication in the Manual. Reports were not presented on the committee's five other assignments.

Revision of the Manual

The committee recommended that, in the present Specifications for Railway Buildings, the first sentence in the first paragraph of Section 110, under General Conditions, be revised to read as follows: All work shall conform with Federal, State or Municipal laws, ordinances or regulations governing such work.

The committee also presented a new Specification for Structural Steel and Iron and recommended that it be approved for

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publication in the Manual in place of the present specification. It reported that the new specification had been prepared by a special committee consisting of members of the committees on (a) Buildings and (b) Water Service, Fire Protection and Sanitation. The specification is presented under nine sectional headings, namely, General, Material, Loads and Forces, Unit Stresses, Design, Fabrication, Inspection, Weighing and Shipping, and Erection.

Three appendices are included with the specification, one of which consists of a tabulation of the weights of materials and of instructions for computing various live loads and impact. Another of the appendices is comprised of a tabulation of allowable unit stresses for beams and girders, while the third consists

of a curve of allowable working stresses plotted against the $\frac{1}{r}$ ratio. With a number of minor amendments offered by the committee and one suggested from the floor, these specifications were approved.

Drinking-Water Facilities in Railway Buildings

The report on drinking-water facilities in railway buildings, which was submitted as information, was prepared in collaboration with the Committee on Water Service, Fire Protection and Sanitation. At the outset, the report classifies and describes the types of drinking-water installations, which include portable units, fixed units and central systems for circulating cooled water. The remainder of the report discusses briefly various aspects of the subject and includes several tables, one of which consists of a tabulation showing drinking water requirements recommended by the National Electrical Manufacturers Association. The committee presented the following conclusions:

The selection of water-cooling equipment will usually be determined by local conditions. At locations where water service and sewer connections are readily available, the fixed mechanical cooling equipment will usually be the most economical. Where the expense of water and sewer connections is not warranted, the portable mechanical cooling unit or the portable iced cooler may be used.

Drop Pits, Jacks and Tables

The report on drop pits, jacks and tables consisted of relatively brief discussions of these devices under separate headings. Under drop pits, the committee gave consideration to such matters as dimensions, safety protection, materials for the floor around the pit, lighting, drainage and service tracks. Four drawings are included, showing typical drop-pit layouts and cross-sections. The discussion of pit jacks and tables consisted of a brief description of typical features of such equipment. The material under this heading was approved for inclusion in the manual.

Records and Accounts

C. A. Knowles, Chairman*

This committee presented a brief report on Revision of the Manual, offered Manual material in connection with reports on three subjects, and reported progress in the study of three other subjects. In addition, in accordance with its usual custom, the committee presented a brief bibliography of books and periodicals pertaining to records and accounts.

Revision of Manual

Under Revision of the Manual, the committee stated that a review of all forms pertaining to the committee's assignments had disclosed that certain forms approved for publication in the Manual had never appeared therein. These forms were listed and it was stated that arrangements have now been made for including them in the Manual.

A revised bridge inspection report for masonry and steel bridges and for trestles was submitted and accepted for publication in the Manual.

Office and Drafting Room Practices

The committee has six assignments pertaining to office and drafting practices, and in its report this year it reported progress

in the study of two subjects and presented reports on four others, namely, methods of folding and punching drawings, scales of reduction and enlargement, width of rolls of paper and cloth, and sizes of drafting equipment and tools.

When reporting last year on methods of folding and punching drawings, the committee presented as information a number of figures illustrating recommended methods. In this year's report it stated that these figures had been revised to include information developed by further study, and recommended that they be adopted for publication in the Manual. This recommendation was approved.

Referring to its assignment regarding scales of reduction and enlargement, the committee said that, after reviewing the report on this assignment submitted in 1939, it had concluded that the subject was adequately covered in that report. Passing on to the third subject—width of rolls of paper and cloth—the committee said that information received from 37 Class I railroads indicates that it is common practice to carry in stock only one or two sizes of drawing paper and tracing cloth. After giving consideration to a table in the Manual giving recommended sizes for railway drawings, the committee compiled a list of recommended widths for various types of tracing and drawing paper, which was presented as information.

In this report on sizes of drafting equipment and tools, the committee pointed out that as a rule the draftsman owns his own drawing instruments while the larger items of equipment are furnished by the company. The items of equipment furnished by the draftsman and the railroad were then listed under separate headings with brief recommendations regarding their purchase. In the latter connection special consideration was given to drawing tables. This chart was adopted.

Maintenance of Way Reports and Records

In its report on maintenance of way reports and records, the committee said that it had completed the preparation of forms for maintenance of way statistics in accordance with its assignment. A chart showing the titles of the forms and their locations in the Proceedings was presented with the recommendation that it be approved for publication in the Manual.

Construction Reports and Records

The committee's report on construction reports and records included three forms for recording descriptive information relative to railroad and overhead bridges, including both those constructed at the sole expense of the carrier and those constructed in whole or in part with public funds. In connection with the numbering of bridges, the committee said that it had given consideration to the method recommended for the identification and designation of bridges shown in Vol. 28 of the Proceedings and that it had revised the material. The revised version was submitted with the report and it was recommended that it be published in the Manual.

Complete instructions for the numbering of buildings were given in the report and the committee recommended that these be adopted for publication in the Manual. Referring to a form for use as a Register of Buildings that was published in Vol. 39 of the Proceedings, the committee recommended that this form be published in the Manual on a page immediately following the material pertaining to the numbering of buildings.

All the committees' recommendations on this subject were approved.

Valuation

Reports on four different aspects of valuation were presented. Among these was a resumé of developments of the current year in connection with regulating bodies and courts. In reporting on its assignment to study Valuation Order No. 3 reports and records to determine if further simplification is possible, the committee presented a communication outlining developments in this respect, which was addressed by E. H. Bunnell, vice-president, Association of American Railroads, to officers in charge of Valuation Order No. 3 records and accounts.

In connection with its assignment to develop a form of Valuation Order No. 3 reports in connection with joint federal-railroad projects, the committee said that it has not yet been able to develop such a form because of continuing indecision with respect to the inventory classification of such property. Referring to its assignment regarding the development of forms for recording ballast installations the committee said that it is doubtful whether

* Valuation Engineer, Chesapeake & Ohio.

such forms can be developed that would be advantageous either as a guide or for use by individual carriers.

Revisions in I. C. C. Classifications

In its report on changes in or revisions of I. C. C. classifications of accounts, the committee presented a list of tentative accounting cases or orders submitted by the Bureau of Accounts of the I. C. C., explaining that they had been reviewed by the committee and that information reflecting the opinion of the committee had been submitted to Mr. Bunnell.

The committee reported that the I. C. C. had made no changes in the accounting classifications since its last report, but that it had released one additional series of accounting rulings and had reissued a number of cases. The committee described in its report only those new cases and the cancellation or revision of old cases that involve the investment or other accounts used in connection with accounting for construction, maintenance or retirement.

Avoiding Duplication of Effort

Regarding its assignment to develop methods of avoiding the duplication of reports to the I. C. C. and other public authorities, the committee reported that no further progress had been made in the efforts of the A. A. R. to secure further simplification in the matter of governmental reporting. The committee also reported, among other developments, that the committee appointed by Mr. Bunnell to simplify Valuation Order No. 3 records and reports had completed its report and that the results had been circularized.

In order that this subject will receive continuous consideration, continued the committee, two subcommittees of the Valuation Advisory committee have been appointed, one an engineering committee and the other an accounting committee. These committees, it said, will continue to give consideration to those simplifications that it is believed should be placed in effect to hold to a minimum the cost to the carriers of the reports required by the Bureau of Valuation of the I. C. C.

Yards and Terminals

Hadley Baldwin, Chairman*

During the year this committee gave consideration to seven assignments, and in its report it offered new material under Revision of Manual, recommended certain revisions in material in the Manual on track scales, presented progress reports on three subjects, and reported progress in the study of two other reports.

Revision of Manual

Under Revision of Manual the committee recommended that the following definitions be adopted for publication in the Manual.

Car Retarder.—A braking device, usually power-operated, built into a railway track to reduce the speed of cars by means of brake-shoes which, when set in braking position, press against the sides of the lower portions of the wheels.

Escalator.—One manufacturer's trade-mark for its moving stairway.

Moving Stairway.—A series of steps, attached to an inclined moving mechanism of the endless chain type, leveling out to meet the floor surface at each end, so that a person stepping on is carried from one elevation to another.

Zone Yard.—An auxiliary yard for assembling freight cars destined to or from tracks located in a certain territory. These definitions were approved.

Auxiliary Yard Facilities and Appurtenances

In reporting on auxiliary yard facilities and appurtenances, the committee confined its attention to wheel and truck-handling equipment for coach yards. After pointing out that, except in the case of large terminals, pairs of wheels are ordinarily changed on pneumatically or hydraulically-operated wheel-dropping jacks usually equipped with a V-block to engage the axle, the committee discussed some of the limitations of such equipment. It stated that modern drop-pit tables greatly simplify the operation and listed four characteristics that should be embodied in such equipment, namely, sufficient capacity, detachable table tops, electric operation and remote control.

Portable high-lift car jacks are preferred by some roads for changing wheels, said the committee, and it went on to discuss various aspects of the use of this type of equipment. Such jacks, it continued, should preferably be easily portable, have a lift of about four feet without resetting the jacks, have ample capacity (25 tons for each jack), and should embody large bases with the loads being carried on the bases instead of on the wheels. A comparison was made between certain features of drop-pit tables and electric jacks, after which the committee dealt briefly with drop-pit tables having four supporting screws.

The committee then turned to the question of providing facilities to handle both streamlined Diesel-electric and standard equipment, pointing out that there is a general tendency to accommodate Diesel-electric equipment in a separate yard having special equipment. If such separate provision is not made it pointed out that an electrically-operated four-support drop-pit table of sufficient capacity and size to handle complete four-wheel and six-wheel Diesel-electric locomotive trucks and passenger car trucks may be provided.

For handling Diesel-electric locomotives in the same yard with coaches, some railroads have proposed the use of a small electric drop-pit table of the screw type for handling single pairs of wheels, and a shallow pit type of transfer table to remove the complete trucks of coaches and Diesel-electric locomotives with the addition of at least two portable high-lift electric jacks. Attention was then given to the use of a low narrow transfer car, frequently referred to as a dolly, as a means of moving wheels between the drop pit and the storage tracks. This report was offered as information.

Scales Used in Railway Service

The committee's report on scales used in railway service embodied recommendations for the revision of four items of Chapter 14 of the Manual. One of these applied to the four paragraphs on maintenance tolerance. Pointing out that the wording of one of these paragraphs was adopted before the two-section track scale came into general use, the committee noted the existence of "a contradiction and inconsistency." To correct this situation and to make the application of the several paragraphs more immediately obvious it recommended the adoption of a revised item on maintenance tolerance.

Referring to the fact that the Manual provides for a special maintenance tolerance for application to railway track scales equipped with automatic recording devices, the committee pointed out that there is nothing to prevent a manufacturer from marketing such a device having a difference between successive indications of, say 200 lb., whereas the present tolerance requirement was adopted on the assumption that the difference between successive indications would be 100 lb. To avoid such a possibility, the committee proposed a rewording of the tolerance requirement in question to the end that the additional tolerance allowed on account of the mechanical construction of the device will in no case exceed 50 lb.

The committee stated that it had received a request from manufacturers of motor truck scales for a slight amendment to the paragraph in the Manual relating to the values of notches and graduations on the weighbeams of motor truck scales, which now reads as follows: In motor truck scales, the value of each notch on the main bar shall be 1,000 lb.

Accordingly, the committee recommended that this item be revised to read: In motor truck scales, the values of the intervals between successive notches or graduations shall be 1,000 lb. on the main bar, and not more than 10 lb. on the fractional bar, respectively.

Explaining that the present table in the Manual setting forth the tolerance applicable to new counterpoise weights was taken from a table promulgated by the National Bureau of Standards and that the latter organization has subsequently revised its recommendations, the committee offered for adoption a revised table of such values. These revisions were approved.

Use of Outlying Yards and Facilities

The report of the committee on the substitution of outlying yards and facilities for yards and other large facilities in cities where land values are high was confined to a consideration of freight terminals. Following a brief preliminary discussion of the subject, including reference to modern trends in freight service, the committee pointed out that when conditions require the expansion or rearrangement of a terminal studies should be

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made to develop the most economical and efficient plans for the future. Such a study, it said, should be made by a committee representing all the interested parties and should embrace a complete analysis of the design, operation and maintenance of the facility.

Various factors that should be given attention when changes in a yard are under consideration were discussed briefly by the committee, after which it listed ten reasons for making changes in freight terminals, as follows: (1) Obsolescence or inadequacy; (2) consolidation of separate facilities (such as engine terminals and train yards); (3) readjustment or consolidation of mechanical repair and maintenance facilities and forces on a division or district; (4) consolidation of the operations of several small inlying yards in a new facility and confining the small yards to zone switching operations; (5) co-ordination with other railways; (6) delays to road trains; (7) delays to switching movements; (8) delay in interchange; (9) change in method of operation; and (10) public body regulations.

When plans are being developed for a new facility, the committee listed the following factors that should be given consideration: (1) Service to shippers and consignee; (2) ratio of fast trains to slow trains handled; (3) possible delays at outlying facility and extra handling of cars; (4) increased switching at outlying facility; (5) possible readjustment of road train schedules; (6) curtailment of operations at inlying facility by doing work at some other place; (7) limiting facility to normal requirements with provision for nominal future expansion; (8) limiting traffic in inlying facility to that requiring preferred handling and run fast trains direct; (9) careful and complete determination of operating procedure for new outlying facility is essential to complete analysis; and (10) complete diagnosis to determine whether some exterior condition is responsible for or contributes to the inadequacy of the inlying facility.

The committee stated that many railways have considered the construction of outlying terminals in substitution for or to supplement inlying yards, and listed six possible advantages of outlying facilities, as follows: (1) Consideration of forces; (2) improved interchange; (3) reduction in road train time; (4) better classification of outbound road trains; (5) new facilities are modern and result in economies through efficiency; and (6) potential value of space occupied by inlying facility for industrial sites and other purposes.

The following possible disadvantages of new outlying facilities were listed: (1) Cost of the facility; (2) increase in delivery time; (3) increased local switching and transfer movement; (4) necessity for increased classification at intermediate terminals and division points to block inland trains for faster terminal distribution; and (5) traffic loss arising through delays to small amount of traffic affecting a particular industry's business and penalizing by that industry at other points.

Bibliography

In accordance with its usual practice, the committee submitted a bibliography of published articles and papers on passenger stations and terminals, freight stations, terminals and yards, locomotive terminals and railroad shops, and rail-and-water terminals. The report of this committee was accepted without discussion except as related to the matter submitted for inclusion in the manual.

Maintenance of Way Work Equipment

G. R. Westcott, Chairman*

This committee reported progress in the study of 7 of its 13 assignments and presented partial or complete reports on six subjects, including standardization of parts and accessories for railway maintenance motor cars, self-contained direct-blow tampers, concrete vibrators, sand-blasting equipment, track welding equipment, and rail loaders and unloaders.

Standardization of Parts for Motor Cars

In reporting on the standardization of parts and accessories for railway maintenance motor cars, the committee offered a design for a gage for mounting motor car wheels and recom-

mended that it be adopted as recommended practice and printed in the Manual. It pointed out that this design contemplates a gage for the wheels $\frac{13}{16}$ in. less than the gage of the track, with a tolerance of $\frac{1}{8}$ in. over the recommended figure and none under.

The committee also presented for consideration as recommended practice a paragraph on differential axles, designated as "10. Differential Axles," which reads as follows:

Loose wheel axles shall be of the differential type and all wheels shall be insulated.

In explaining the considerations leading to this recommendation, the committee said that (a) the cost of maintaining bronze-bushed loose wheels is abnormally high and the use of the differential-type axle is considered on the side of economy, and (b) that the demand for more complete insulation of cars is strong and this can be accomplished only by insulating all wheels.

All the committees recommendations under this heading were approved.

Self-Contained Direct-Blow Gasoline Tampers

One of the committee's assignments is to report on self-contained direct-blow gasoline tampers. This year it pointed out that a full report on one tamber of this type was presented in 1938 and that, while there are several other types in the process of development, none has reached such a stage as to warrant detailed consideration at this time.

Concrete Vibrators

In its report on concrete vibrators, which was submitted as information, the committee pointed out that, as distinguished by the character of the power employed, there are four types of vibrators, namely, pneumatic, electric, hydraulic and mechanical. Next, the committee described the character of the mechanical action employed in each type of vibrator, after which it explained that the linear or tapping type of vibration is generally used to improve surface appearance, while the rotary or orbital type is usually employed for the consolidation of the entire mass of concrete, on the assumption that vibrating the concrete will break down the tendency of larger particles to lock before all interstices are filled.

In the remainder of the report, which contained several quotations from a report on the same subject by M. C. Withey, professor of mechanics, University of Wisconsin, the questions of frequency and force of vibration were discussed in some detail; also the relationship between amplitude and frequency was given consideration. In addition the committee described the various methods used in connection with the different vibrators for imparting the vibratory action to concrete. The following conclusions were presented:

Conclusions

A. Linear or oscillating vibrators are less effective than orbital or rotating types for consolidating masses of concrete, but are satisfactory for vibrating forms.

B. Since the effect of vibrators applied on the forms penetrates the mass to a limited depth only, this method is most effective where the section of concrete is thin, or for producing a better surface under the form.

C. Rotating or orbital vibrators, as applied through a spud thrust into the mass of the concrete, are most effective in consolidating the mass.

D. Frequency rate and amplitude must be correlated.

E. The results obtained from a rotary vibrator of fixed characteristics of frequency and amplitude will vary with the characteristics of the mix as to moisture content and kind of aggregate.

F. Where a large volume of concrete is to be vibrated, it is desirable to use several vibrators instead of resorting to excessive frequency and amplitude of a single vibrator.

G. The choice of power to be used is largely dependent on local conditions, such as the relative location of the work to the source of power, and the amount of concrete being placed.

Sand-Blasting Equipment

In its report on sand-blasting equipment, the committee noted at the outset that, due to the fact that so few railroads do sand-blast cleaning in maintenance of way operations, resulting in a dearth of information, it was necessary to limit the scope of the

* Assistant Engineer, Missouri Pacific.

report. It pointed out that sand-blasting machines suitable for maintenance of way work can be divided into two groups, those employing direct pneumatic pressure and those involving the use of suction. In machines in the first group the abrasive substance is blown from a container through a hose and nozzle by compressed air, while in the second group use is made of a vacuum to draw the abrasive from a chamber and discharge it through a nozzle. In still another group of machines, other methods are used for propelling the sand, grit or shot, the two most important of these being the blower and centrifugal force.

Pointing out that compressed air predominates as a source of power for propelling the abrasive, the report outlined the advantages and disadvantages of this method as compared with mechanical means of propulsion, such as blowers and centrifugal force. Discussing air pressure and air flow, it pointed out that, when the material is of such a nature that it will not warp under the impact of abrasives at high pressures, it is generally recommended that pressures of from 80 to 90 lb. per sq. in. be used. There is a definite relationship between the flow of air and the nozzle diameter, said the report, which must be recognized if maximum efficiency is to be obtained.

Turning to the question of nozzles, the committee reviewed the development of this accessory and described two special devices, the rotary blast head and the sand-blast gun. Pointing out that the speed of cleaning increases with the nozzle size, the committee said that it is generally desirable to use as large a nozzle as the air supply will permit. The size of the abrasive used also has a bearing on the size of the nozzle. Tabulations were included showing the approximate cleaning capacities and air requirements for the more common sizes of nozzles, and the relationship between the size of the air jet and that of the nozzle.

The committee then turned its attention to abrasives and discussed the characteristics of both sand and steel abrasives. A tabulation was included, comparing the flow per hour of sand and steel abrasives through nozzles of different sizes. In a discussion of sand-blast hose, the committee described the construction of several types of such hose, and discussed the relationship between the diameter of the hose and the size of the nozzle and the length of the hose line. This report was offered as information.

Track Welding Equipment

The committee's report on track-welding equipment consisted of an extended discussion of the various materials and units of equipment employed in oxy-acetylene welding. The report first reviewed briefly the development of the oxy-acetylene process, after which it described the characteristics of the oxy-acetylene flame, pointing out that varying proportions of the gases produce three types of flames—reducing (carburizing) neutral and oxidizing.

After tracing the growth of oxy-acetylene welding as a means of building up battered rail ends and repairing special trackwork, the committee described the physical characteristics and the methods of manufacture of both oxygen and acetylene, and gave details regarding the dimensions and other characteristics of the cylinders in which these gases are confined. Welding rods were discussed briefly and a list of 13 different types of rods was given.

Next, the committee listed the various types of equipment and tools that are required to perform satisfactory oxy-acetylene welding work, after which it described the construction of the injector and pressure-type welding torches. In a discussion of welding tips it was pointed out that, while welding torches ordinarily provide for only one flame, torches having two or three flames are being used. Two and three-tip torches that are in use on one road were described in some detail.

The purpose and construction of pressure regulators used in gas welding were given consideration, and manifolds and hose were treated briefly. Detailed instructions were included for setting up oxygen and acetylene cylinders preliminary to welding and for taking them down afterwards. Illustrations accompanying this report included a number of drawings of the various units of equipment described. The report was offered as information.

Rail Loaders and Unloaders

At the beginning of its report on rail loaders and unloaders, which was offered as information, the committee presented a

brief discussion of the types of equipment that are now in use for this purpose. In this connection it pointed out that a survey of equipment used for handling rails on several representative railroads indicated that the practice is prevalent of using for this purpose whatever type of crane is available at the time the work is being done. The committee then traced the development of rail handling equipment, from the earlier machines of the hand crank or windlass type, through those using compressed air for hoisting purposes to the modern machines employing internal combustion engines.

The committee then listed the desirable characteristics of a crane for handling rail, and described a popular machine that is now in use on a number of railroads. Pointing out that the demand of train service employees that crews be placed on all self-propelled cranes operating on the rails has greatly increased the cost of operation, the committee said that increased attention is being given the possible use of off-track machines for handling and laying rail. Comparison was then made of the advantages and disadvantages of on-track and off-track machines. The following conclusions were presented:

Machines that can be used only for loading and unloading rail are not economical.

When purchasing new machines, consideration should be given to the adaptability of the machine to laying rail and other classes of work.

The greater development and use of off-track machines will prove economical.

Iron and Steel Structures

R. A. Van Ness, Chairman*

This committee presented a report on Revision of the Manual and a complete report, offered as information, on progress in the design of steel bridge details. Regarding its assignment pertaining to the design of connections in which rivets develop tension, the report took the form of a paper by W. M. Wilson, research professor of structural engineering, University of Illinois, entitled Design of Connection Angles for Stringers of Railway Bridges, which was published as information in Bulletin 412.

Revision of Manual

Under Revision of Manual, the committee offered numerous revisions in the specifications for steel railway bridges and in the rules for rating existing iron and steel bridges. With a few minor changes these revisions were adapted.

Progress in Design of Steel Bridge Details

In preparation for its report on progress in the design of steel bridge details the committee sent letters to a number of bridge engineers, requesting them to send in sketches showing faulty bridge details actually observed in existing bridges. In its report the committee presented 32 such sketches, together with a discussion of the principal points of interest concerning each of them.

Also included was a section in which the committee discussed some of the principles underlying the various types of failure. Much of this discussion dealt with the effects of frequent stress repetition and of reversals of stress, and in this connection reference was made to recent experiments conducted by the University of Illinois and reported in Bulletin 302. Particular attention was given to the results of fatigue tests that were made on specimens containing unfilled holes or holes containing rivets.

Report on Masonry

J. F. Leonard, Chairman†

Reports were presented by this committee on 9 of its 14 assignments, most of which were offered as information although two of the reports contained recommendations regarding Manual material. Progress was reported by the committee in the study of four other subjects, and in connection with its assignment to maintain contact with the Joint Committee on Concrete and Reinforced Concrete, it reported that the members of the Joint

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† Engineer Bridges and Buildings, Central Region, Pennsylvania.

committee have received the final report for ballot approval. Later this report will be presented to the sponsoring bodies, which include the A. R. E. A., for approval, probably in the early part of 1940.

Revision of Manual

The committee recommended that the A. S. T. M. designation for the specification for high early strength cement, appearing on page 8-5 of the Manual, be changed to C74-38, and offered a new paragraph to replace paragraphs (a) and (b) of Section 9, page 8-7. The proposed paragraph reads as follows:

Compressive Strength—Compressive strength, when specified (Section 4, option 2), shall be determined in accordance with the A. S. T. M. Tentative Method of Test for Compressive Strength of Portland-Cement Mortars, Designation C109-34T.

A footnote change necessitated by the adoption of the new paragraph was proposed and a slight editorial change in Section 4 was recommended. Also the committee recommended that the titles of the present specifications covering the making and driving of concrete piles be revised to substitute the word "precast" for "pre-molded." In addition, it recommended the deletion of the second paragraph under Article II of the Specifications for Pile Foundations and the substitution therefor of the following paragraph:

Depending on subsoil conditions, piles act as columns to carry the supported load to the hard substrata, or consolidate and transfer the load to less firm substrata by skin friction. The committees recommendations under this heading were approved.

Design of Plain and Reinforced Concrete

In connection with its assignment regarding specifications and principles of design of plain and reinforced concrete, the committee reported separately on the three subdivisions of this subject. It reported progress on Section (a)—composite columns and pipe columns—but said that it is deferring a final report until a definite specification has been approved by the Joint Committee on Concrete and Reinforced Concrete.

The report on Section (b)—rigid frame bridges as related to multiple spans—dealt with the application of the rigid frame principle to reinforced concrete box abutments for grade separation bridges and was presented as information. This report reviewed the development of the box-type abutment, listed the advantages and disadvantages of this type of construction, gave brief attention to design considerations and presented photographs and drawings of typical structures.

To gather information regarding Section (C) of the assignment—concrete bridge decks of the non-ballast type, the committee distributed a questionnaire based on 11 different types of construction. Answers to the questionnaire that were applicable to such treatment were given in tabular form, while the replies to more general questions were summarized in an exhibit. This portion of the report was submitted as information.

Progress in Concrete Manufacture

The committee's report on progress in the science and art of concrete manufacture was devoted entirely to the autoclave test of Portland cement. Pointing out that this test was first used on the Delaware, Lackawanna & Western in 1909, the committee discussed various aspects of its application during the intervening period. To develop the significance of the autoclave test, the committee devoted a considerable part of its report to a discussion of the compounds in cement that are affected by high-pressure steam. The significance of the test was summarized as follows:

First, the test is more severe than the present standard pat test; second, it is serviceable in ruling out cement which is unsound due to the presence of damaging amounts of hard-burned free lime (CaO), or of crystalline magnesia (MgO) in a form which chemical analysis will not isolate; and third, the test does not go beyond the detection of unsoundness and should not be considered as a cure-all against possibilities of inferior cement.

The committee presented as a part of its report the text of the suggested method of making the test for autoclave expansion of Portland cement as it was published in the proceedings of the A. S. T. M. for 1938.

Specifications for Foundations

In reporting on its assignment to develop specifications for foundations, the committee called attention to the fact that Articles

I to V, inclusive, of a set of such specifications were adopted last year for publication in the Manual and that Articles VI, VII and VIII were submitted as information. With a few minor changes, the latter three articles were submitted in this year's report with the recommendation that they be adopted and published in the Manual. Article VI deals with types of piles and contains sections on timber, concrete, cast-in-place, steel, pipe and composite piles. Article VII is devoted to the driving and Article VIII to the spacing of piles. These articles were adopted.

Lining and Relining Tunnels

The committee's report on methods and practices of lining and relining tunnels consisted of a set of specifications for lining railway tunnels with brick, which were submitted as information with the object of presenting them later for adoption and publication in the Manual. These specifications contain three articles entitled General, Materials and Design. The materials given consideration are brick, mortar, cement, lime, sand and water, while, under design, attention is given to interior dimensions, floor and ballast walls, foundations for side walls, side walls and arches, drainage openings and refuge niches.

Rating of Reinforced Concrete Bridges

The committee said that over the past two years it had canvassed the railroad engineering profession regarding the rating of reinforced concrete bridges and that it had found a practically unanimous sentiment to the effect that each bridge of this type is an individual problem with characteristics and conditions of its own, which make it inadvisable to determine its capacity by hard and fast rules.

Progress in Cement Manufacture and Testing

A comprehensive report was submitted by the committee on its assignment to report progress in cement manufacture and testing. First, the committee described briefly the manufacturing and chemical processes involved in making Portland cement, after which it summarized some of the more important relationships between the chemical composition of Portland cement and such characteristics as strength, length changes, resistance to sulphate waters, resistance to freezing and thawing and heat of hydration.

Next the committee quoted in its entirety a summary of a report on the nature of hydrated cement by L. S. Brown and R. W. Carlson, which was published originally in the proceedings of the A. S. T. M. It then reviewed briefly a number of new developments in cement manufacture. The principal mechanical changes, said the committee, have been the introduction of air separators and the general adoption of closed circuit grinding for both raw materials and burned clinker. It also reported that the wet grinding of raw materials had come into general use, and that the length of kilns had been increased.

The committee then listed the various classes of cement now in use, namely, Portland cement, blended cements, natural cement, masonry cements and calcium-aluminate cement, and described briefly the character and uses of each of them. This material was followed by an extended discussion of methods of testing cement, and as the concluding feature of the report a tabulation was presented comparing the requirements of various cement specifications.

Specifications for Concrete Culvert Pipe

The report of the committee on its assignment to develop specifications for concrete culvert pipe comprised a set of specifications for placing such pipe. These include sections on bedding, foundation and camber, backfill and embankment, jacking pipe through fills, constructing culverts in tunnels, and joints. A number of drawings were included illustrating the different types of bedding and various ditch conditions. These specifications were offered as information.

Pressure Grouting

The committee's report on pressure grouting consisted principally of excerpts from papers and reports showing different applications of this process. Among the projects described in these excerpts were the grouting of the foundations and construction joints of the Calderwood dam on the Little Tennessee river, the grouting of the lining in the Franklin tunnel of the

Atchison, Topeka & Santa Fe, and the consolidation of unstable foundation soil on the Chesapeake & Ohio by the cementation process. Brief attention was also given the application of grouting to unit masonry structures and foundation caissons, and a number of other quotations of a more general nature were included. This report was presented as information.

Wood Bridges and Trestles

H. M. Church, Chairman*

In reporting on its 11 assignments this committee noted progress in the study of seven subjects and presented reports on four assignments, namely, those pertaining to the simplification of grading rules and classification of timber for railway uses, recommended relationships between the energy of the hammer and the weight or mass of pile for proper pile driving, specifications and design of fastenings for timber structures, including metal joint connections, and the use of tar and asphalt compositions for wearing surfaces on wood-floored highway bridges.

Simplification of Grading and Classification of Timber

In its report on the simplification of grading rules and the classification of timber for railway uses, the committee, explaining that it is often difficult to distinguish between a knot and the surrounding wood, offered as information a memorandum on the subject by J. A. Newlin, a member of the committee and a specialist in the mechanics of wood with the Forest Products Laboratory, Forest Service, U. S. Department of Agriculture, Madison, Wis. The memorandum had previously been published in a committee report of the American Society for Testing Materials.

Mr. Newlin offered two methods of determining the limits of live knots in cases where they are not clearly indicated by the color or general appearance of the wood. The first of these is based on differences in the width of growth rings in knots as compared with those in the surrounding wood, while the second is predicated on the appearance of checks that extend radially from the pith center of the knots. Mr. Newlin pointed out that those checks running to the sides of the knot never extend beyond its outer limits without an abrupt change in direction.

Relationships Between Hammer and Pile

The committee's report on recommended relationships between the energy of hammer and the weight or mass of pile for proper driving was comprised principally of a set of specifications for driving wood piles, which was offered for inclusion in the Manual in place of the present material. These specifications were presented under ten paragraph headings, namely, scope, tests, materials, handling of material, selection and preparation of piles, types of hammers, driving, framing, foundation piles and protection work.

The committee also offered as information a redraft of the conclusions on this subject that were given in its report for 1939, explaining that the revisions were confined to the first paragraph under steam hammers. This paragraph now reads as follows:

For driving concrete piles, the striking part of the hammer should weigh not less than 2,500 lb. and develop energy per blow of 8,750 foot-pounds per cubic yard of concrete contained in the pile to be driven. With certain minor changes these specifications were adopted.

Fastenings for Timber Structures

In its report on specifications and design of fastenings for timber structures, including metal joint connectors, the committee pointed out that since 1936, when the last previous report on timber connectors was published, four new types have been developed, namely, the spike-grid, clamping plates, claw plates and shear plates. It stated that the first two should be of particular interest to members of the A. R. E. A. and that, while the latter two types do not apply as generally to trestle design, they are applicable to the types of joints used in framed timber bridges.

The report described each of the four new types of connectors separately, discussed their purposes and application and gave other pertinent details. In each case a table was given showing

the allowable design loads, based on a factor of safety of four, when the connector is used with dense Douglas fir and southern pine.

The committee also pointed out that the split-ring connector has been improved recently by the application of an inside bevel and a rounded mill edge. These changes, it said, enable the rings to be placed in their grooves much more easily, particularly when several rings are placed in a group. Presented with the report were drawings showing types of connectors discussed in this and previous reports of the committee, and another drawing showing suggested applications of connectors to various types of timber connections.

Tar and Asphalt Compositions for Wearing Surfaces

In reporting on the use of tar and asphalt compositions for wearing surfaces on wood-floored highway bridges the committee pointed out that a report containing specifications was submitted as information in 1938. These specifications were revised during the year and were again presented as information.

The specifications first discuss the general requirements of wood floors for this purpose, and then give consideration separately to the preparation of single-plank floors, double-plank floors, vertical laminated floors, grooved laminated floors and saw-tooth laminated floors. Contained in the specifications are directions for the construction of tar mat and asphalt surfaces and for the use of bituminous cut-backs and asphalt emulsion; cold asphalt concrete, liquefier type; and cold-lay tar-concrete, two course construction.

Waterproofing of Railway Structures

J. A. Lahmer, Chairman*

This committee presented a report on Revision of the Manual and also explained briefly certain developments that occurred during the year pertaining to the waterproofing and dampproofing of railway structures.

Revision of Manual

Under Revision of the Manual, the committee recommended that, in the ductility test at 40 deg. F. for asphalt for a saturant and mopping above ground, the specified rate of elongation per minute, now given as 1 cm. in Section 202 of the specifications for membrane waterproofing, be changed to $\frac{1}{4}$ cm. This reduction was recommended because the committee believes that it will result in a lessening of the possibility of premature rupture due to mechanical jar or other causes in what is considered a delicate test. It also explained that the proposed rate of elongation is in excess of that which will normally be developed in actual service.

The committee also offered for adoption a revised version of the first sentence in paragraph 7, Section 301, of the same specifications and recommended that Section 212 of the Manual, which covers plastic cement having an asphalt base, be revised to include plastic cement having a coal tar base. The proposed new section was included with the report.

Pointing out that the present specifications for membrane waterproofing provide for asphalt mastic protective cover, the committee recommended certain changes in these specifications, the purpose of which is to make provision for coal-tar pitch mastic protective cover, and to make the requirements for fine mineral aggregate more definite.

Waterproofing and Dampproofing of Railway Structures

In reporting on the waterproofing and dampproofing of railway structures, the committee said that it had given further consideration to the request made by the A. S. T. M. that the A. R. E. A. comment on certain revised specifications of the former society the most important of which covers asphalt for saturant and mopping in connection with membrane waterproofing for use above ground. The A. S. T. M., said the report, does not seem disposed to raise the requirements in its tentative specifications, and the committee does not deem it advisable to lower any of the requirements in the specifications in the Manual.

The committee said that information had been received to the effect that asphalt from Mexican crude oil, that will meet the

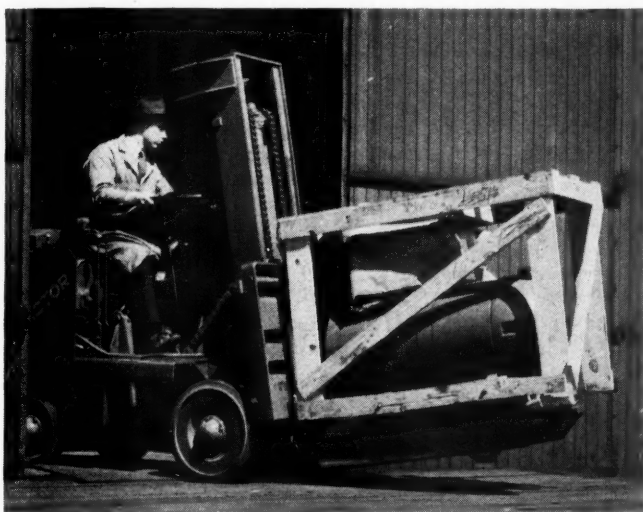
* General Supervisor Bridges and Buildings, Chesapeake & Ohio.

* Senior Assistant Engineer, Missouri Pacific.

A. R. E. A. specifications is again being offered in the United States. Also, it said that there is reason to believe that asphalt from domestic crude that will meet the requirements of the present A. R. E. A. specification will be available if the rate of elongation in the test for ductility at 40 deg. F. is reduced, as recommended under Revision of Manual. With a few minor revisions all of the recommendations of the committee were approved.

Lift Truck With Short Wheelbase

THE new Towmotor Carloader is designed with a 47-in. wheelbase for maneuvering more quickly in railway freight cars. It is a gas-powered hydraulic-lift truck of the center-control type. The steering is controlled by the two wheels at the rear in order that



The Towmotor Lift Truck Has a 47-In. Wheelbase

short pivot turns may be made on either of the two driving wheels at the load-carrying end. Its speed of travel is from one-half to eight miles per hour, both forward and reverse, with two speeds forward and two

speeds in reverse. The minimum and maximum speeds of the lift are 40 and 60 ft. per min., respectively.

The frame is of all-welded box-type construction and fabricated from extra-heavy steel plate. The motor is mounted on rubber. The motor and transmission assembly is flexible and connected to the drive axle by a propeller shaft with two universal joints. The oil pump for the hydraulic lift is operated through a constant drive from the motor to avoid clutching. The truck has a lifting capacity of 4,000 lb. It is manufactured by the Towmotor Co., Cleveland, Ohio.

New Books...

The Southern Pacific Company (in German), by Dr. Heinz Gutsche. 166 pages. 6 in. by 9¾ in. Bound in paper. Published by Deichert'sche Verlagsbuchhandlung, 17 King Street, Leipzig Germany. Price \$3.

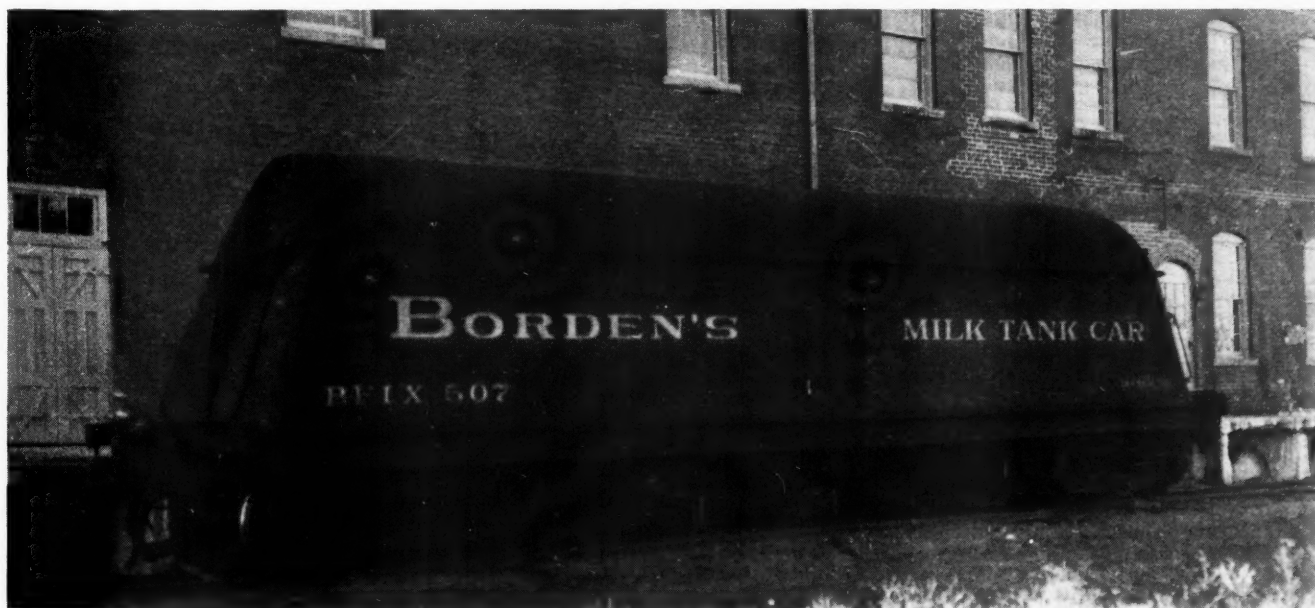
A typical product of thorough, detailed German scholarship, this German economic study analyzes the history, financial structure and revenues and expenses of the Southern Pacific and all subsidiaries, including electric lines and the Mexican system. Elaborate tables and schematic diagrams show inter-company relationships and revenue and expense accounts as of 1936 are reprinted in translation in full.

The Southern Pacific evidently appealed to its author as a subject for such intensive study because of its size, the multiplicity of its interests and operations, its former monopoly status and early experiences with government aid and direction.

The Railroads: Government Ownership in Practice, compiled by Harrison Boyd Summers and Robert E. Summers. 144 pages. 7½ in. by 5¼ in. Bound in paper. Published by H. W. Wilson Co., New York. Price \$0.75.

This comparatively brief volume of quotations from texts, articles and addresses in effect serves as a supplement to a previous volume of the Wilson "Reference Shelf" series on "The Railroad Problem." Its aim is primarily to present a brief idea of the experience of other nations with government ownership of railroads and, as well, the record of government operation of our own carriers during the World War. Most of the material presented consists of excerpts from technical publications and public reports of carriers, governments and regulatory commissions. Whenever available, the most significant statistics of each country have been presented.

* * *



This Milk-Tank Car Travels Daily Between Sussex, N. J., and Hoboken via L. & N. E. and Lackawanna.

NEWS

Senator Wheeler Takes the Air

Discusses transportation on radio with J. J. Pelley and river and truck speakers

Senator Wheeler of Montana, chairman of the Senate committee on interstate commerce, and spokesmen for rail, highway and water transport participated on the evening of March 10 in the transportation program, broadcast from Washington, D. C., by the American Forum of the Air. The railroads were represented by J. J. Pelley, president of the Association of American Railroads; highway transportation by Chester H. Gray, director of the National Highway Users Conference; and water transport by William J. Driver, chairman of the National Rivers & Harbors Congress. On the following evening Senator Wheeler was again on the air with another talk on transportation—that time as the speaker on the National Radio Forum program sponsored by the Washington Evening Star.

In his March 10 talk, Senator Wheeler discussed S. 2009, the pending omnibus transportation bill, mentioning its provisions for the regulation of water carriers by the Interstate Commerce Commission. He said that the water carriers, getting subsidies as well as loans from the government at low rates, should be the last to complain about regulation. He also asserted that the users of the waterways do not pass on to consumers the "savings" in transportation costs; and at another point observed that waterway lobbyists might be responsible for pork-barrel appropriations, but the taxpayer foots the bill.

President Pelley of the A. A. R. looked into the causes of railway financial difficulties and found that such difficulties are not concerned with service, or rates, or capitalization, or debt, or coordination or consolidation. "Whatever might be done about them would not solve the problem," he said, as he proceeded to ask "What, then, is the trouble?"

"Stated plainly," Mr. Pelley went on, "the trouble is that we have lost a substantial part of our business to other forms of transportation . . . Most of it has been lost because railroads have to do business under one policy, while other forms of transportation do business under an entirely different policy. Railroads are expected to meet all their own costs. . . . The highway carriers do not pay what they should for the use of the highways. The airway operators pay only a very nominal sum

B. L. F. & E. on Skis

Sun Valley, Idaho, famous Union Pacific mountain resort where winter skiing and summer swimming exist side by side, is to be the headquarters for the West Coast Union meeting of the Brotherhood of Locomotive Firemen & Enginemen, June 27 to 29, inclusive. To judge by the elaborate article in the current issue of the B. L. F. & E. magazine which describes the ski lift in great detail, the locomotive men and their wives are planning to take up seriously America's most popular form of down-hill transportation.

for use of airway facilities. The waterway operators pay absolutely nothing for the use of improved waterways provided for them at public expense."

The remedy, Mr. Pelley concluded, is to treat all agencies of transportation alike; and the A. A. R. President is "very hopeful" that this Congress will enact legislation which will be "a step forward in the solution of the transportation question." He added, however, that the problem won't be solved "until the national and state governments adopt a policy of treating all agencies of transport alike—and by alike I mean alike in matters of taxation, regulation and public policy generally."

Director Gray of the Highway Users Conference suggested that the time has come "to view the transportation question in relation to its effect on the cost of living," adding that everyone can avoid "allowing or encouraging transportation costs ever to increase." Too much transport legislation, Mr. Gray thinks, "is designed to put the different methods of transportation on an 'equality' so that one can have no advantage over another in serving the people; and so that the inherent characteristics of any one method of transport are denied free operation." In his opinion "there must be less rather than more regulation on the transportation machinery of the nation;" in which connection "it is much to be preferred to ease up on railroad regulation than to strait-jacket with excessive regulations all types, or any one type, of transportation."

Next Mr. Gray undertook to deal with the charge that highway users do not pay their way, quoting amounts which appeared to him "to be enough." He added, however, that "there is danger that more funds will be necessary if highways should unfortunately come to be considered as a

(Continued on page 528)

O. C. Seeks to Close 96 Miles

Old Colony wants to abandon the entire Boston group of steam lines

Approval for what may be the first complete abandonment of an entire group of metropolitan steam railroad lines in the country is sought in a petition of the trustees of the New York, New Haven & Hartford and the Old Colony for Interstate Commerce Commission authority to abandon the so-called Boston group lines of the latter road, hearings on which opened in the Lenox hotel, Boston, Mass., on March 11, before O. E. Sweet, director of I. C. C.'s Bureau of Finance. The New Haven trustees (who are operating the Old Colony property under court direction) seek to close down for both freight and passenger service some 96 route-miles of line connecting South Shore points with South Station, Boston, a large portion of which are double- or multiple-tracked and which, before the rise of motor competition, carried one of the heaviest passenger volumes in the country. Briefly, the abandonment petition covers the Old Colony lines known as the via Atlantic route (as distinguished from the Back Bay route) and comprising the following main segments, together with their respective branches: Boston-Braintree; Braintree-Greenbush; Braintree-Plymouth; Braintree-Middleboro. The so-called Western and Cape Cod lines of the O. C. are not affected.

The New Haven points out that during the approximately five years in which it has operated the Old Colony (i. e. since disaffirmance of its lease of the road) for the account of the latter, it has incurred operating deficits of over \$10,000,000. In spite of recent service curtailments, deficits charged against the O. C. property are still accumulating at the rate of \$1,500,000 a year. Counsel estimates that abandonment of the Boston group would save some \$1,700,000 in a standard year and declares that roughly 75 per cent of the Old Colony loss is due to the Boston group.

The Boston group has suffered tremendous losses in both freight and passenger traffic. The compactness of the territory it serves and the fact that most of its freight is high-value manufactured products moving to diverse destinations makes it especially vulnerable to motor trucks, while the increase in the use of private automobiles not only for casual travel but

for commuting as well (parking lots have trebled in down-town Boston and transit lines offer parking space at most of their outlying termini) has undermined its passenger business. Figures show that passenger travel in 1939 on the Boston group was but 44 per cent of the volume in 1923.

The restoration of train service to 32 New Haven passenger stations in the Boston area ordered effective March 10 by the Massachusetts Department of Public Utilities (reported in the *Railway Age* of March 2, page 422) affects only the East Braintree station of the O. C. Boston group and does not modify the present complement of its passenger runs.

Of real importance to the future of the Old Colony, however, is an order of the Department dated March 7 which stipulates in detail "a modified basis of an interim minimum service plan" for the Boston group and Cape Cod lines of the road, effective March 31. The schedules stipulated follow in general a service plan known as Plan L-C, recommended jointly by the railroad trustees and a majority of the members of a special recess commission of the Massachusetts General Court after a series of meetings.

It will be recalled that the trustees originally notified the Department of their intention to discontinue passenger service entirely on the Cape and Boston group lines, effective September 24, 1939. After conferences, the federal district court at New Haven, Conn., permitted the trustees to postpone the date of discontinuance to January 1, 1940, on condition that the railroads, the Attorney-General of Massachusetts and members of the special recess commission proceed "with dispatch" to arrive at a service plan which would reduce

losses incurred by the O. C. Plan L-C is the result.

In issuing its order, the department complained that the haste with which it was forced to consider the plan was "not conducive to security of thought nor the freedom of action with which we are accustomed to approach our problems" and that it was not a party to the court conference at New Haven and hence not bound by the condition of speedy action. It declared, however, that "time is of the essence" in view of the abandonment petition before the I. C. C. and the present elimination of the Old Colony from the plan of reorganization of the New Haven.

The Old Colony claims that it loses \$670,744 a year from passenger-train operation in the Boston group, not including allocated costs for its use of South station facilities of approximately \$600,000 per annum. Under the interim minimum service plan proposed, the above loss would be reduced to \$300,761, a saving of \$369,983, while South station rents would be reduced by \$150,000 a year. Schedules under Plan L-C would result in a reduction of 42 per cent in train-miles operated; would reduce the present train-mile loss from 65 cents to 50 cents and cut the number of employees from 185 to 120.

The modified plan, as ordered by the Department, follows the original in providing hourly service in off-peak hours between Boston and Braintree, with more frequent service at rush-hours, and rush-hour service on each of the routes Boston-Greenbush, Boston-Plymouth and Boston-Middleboro-Cape Cod. The Department stipulated the addition of a few off-peak hour trains on the latter routes south of Braintree and ordered that the gas-electric

rail-motor car which covers the North Abington-West Hanover branch in rush-hours only be utilized in a "V" service during the day between Braintree and Cohasset and Braintree and Whitman.

Former Head of Clerks Dies

John J. Carrigan, president of the Brotherhood of Railway Clerks from 1910 to 1918, died of a heart ailment in Memphis, Tenn., on March 7, at the age of 75 years.

Status of R. F. C. Rail Loans

The monthly financial statement of the Reconstruction Finance Corporation as of February 29 shows loans to railroads (including receivers) of \$677,867,461 and repayments of \$219,026,619.

I. C. C. Practitioner Suspended

The Interstate Commerce Commission, Division 1, has made public a report and order suspending Thaxton Richardson of Greensboro, N. C., from practice before the commission for a period of two years. The action of the commission is based on findings that freight bills used as evidence in "grandfather" cases under the Motor Carrier Act had been altered while in the custody of the respondent.

Nebraska Transportation Conference April 15

The University of Nebraska will hold its second annual transportation conference at Lincoln, Neb., on April 15. Joseph B. Eastman, chairman of the Interstate Commerce Commission and Lewis C. Sorrell, professor of transportation of the University of Chicago, will lead round table discussions. Mr. Eastman will be the principal speaker at the evening meeting.

Retirement Act Amendment

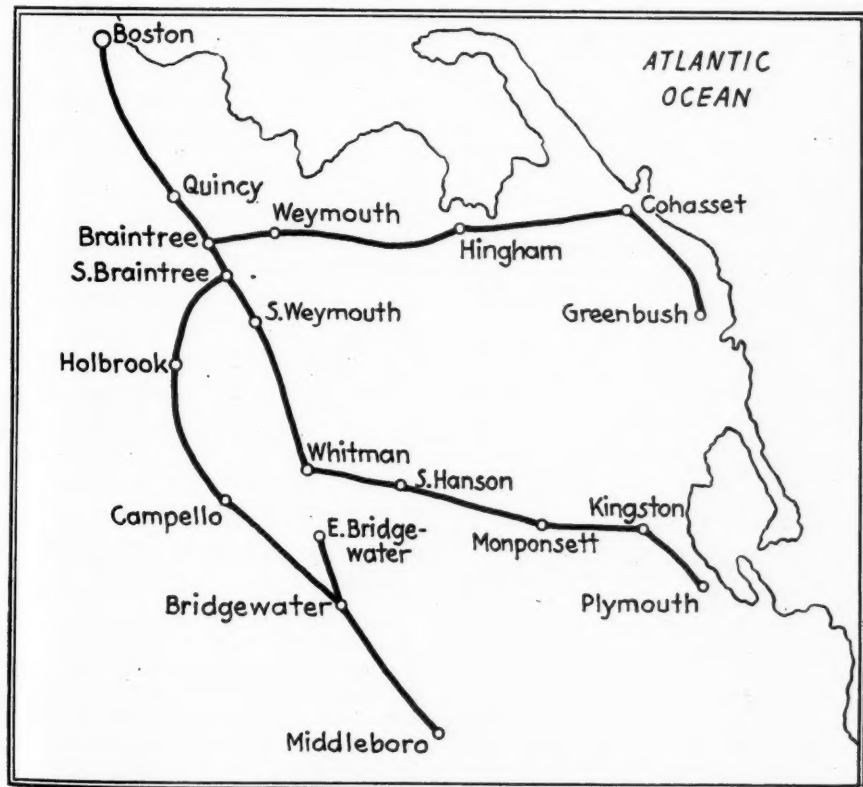
Senator McKellar, Democrat of Tennessee, has introduced S. 3536 to amend the Railroad Retirement Act so as to provide benefits for persons employed on or after January 1, 1930, but who on the law's enactment date were furloughed by reason of the discontinuance of the work on which they were engaged. There would be a proviso that persons involved would have to have remained "ready and willing" to return to service.

Nurses and Stewards in "Battle of Sexes"

Four courier-nurses of the Scout of the Atchison, Topeka & Santa Fe and a like number of dining car stewards from the New York, New Haven & Hartford will participate in the "Battle of the Sexes" radio program of the manufacturers of Molle shaving cream at New York on March 19. The broadcast will be over the Red Network of the National Broadcasting Company.

New York Railroad Club to Meet March 21

The New York Railroad Club will hold its next meeting on Thursday, March 21, at the Engineering Societies Building, 33 West 39th street, New York. The program entitled "Electrical Night," will include an address by M. W. Smith, vice-



The So-Called "Boston Group" Lines of the Old Colony Which the New Haven Seeks to Abandon

president in charge of engineering, Westinghouse Electric & Manufacturing Co., on "Engineering and Research in Industry," touching upon developments for application to railroads, and an elaborate entertainment under the auspices of Westinghouse.

Status of Electric Railways

Division 3 of the Interstate Commerce Commission has found that the Portland Traction Company comes within the exemption proviso in sections 1 (a) of the Railroad Retirement Act of 1937, the Railroad Unemployment Insurance Act, and the Carriers Taxing Act of 1937, and is therefore, not subject to these statutes.

At the same time Division 3 has ruled that the Denver & Intermountain is more than a street, interurban, or suburban electric railway and, therefore, does not come within the exemption proviso of the above-mentioned acts.

Rates on Paper to and Between Points in the Southwest

Examiner H. W. Archer has recommended in a proposed report that the Interstate Commerce Commission find not justified a railroad proposal to revise rates on paper and paper articles between points in the Southwest, and from Western, Trunk Line, Official and Southeaster territories to the Southwest, embracing both increases and reductions. The examiner would have the finding without prejudice to the establishment of maximum reasonable rates as set forth in his report. The title case is docketed as I. & S. No. 4569.

House Hearings on Bills for Tolls on Waterway Locks

The House committee on interstate and foreign commerce this week announced that hearings before a sub-committee will begin March 18 on H. R. 6939 and H. R. 7633, bills proposing to prescribe tolls "to be paid for the use of locks on all rivers of the United States." In this connection, as noted in the *Railway Age* of January 13, page 142, President Roosevelt suggested in his budget message that Congress make a special study of the possibilities of collecting fees from users of lakes, channels, harbors and coasts.

Transportation of Explosives in 1939

Railroads of the United States and Canada in 1939 transported without accident, death or injury, approximately 500,000,000 pounds of high explosives which includes among other things, dynamite, black and smokeless powder, explosive ammunition, and blasting caps, according to the Bureau of Explosives of the Association of American Railroads. This is the thirteenth consecutive year that there has not been a person killed or injured in connection with the movement over the railroads of this country and Canada of billions of pounds of dangerous explosives transported during that time.

The railroads in 1939 also transported great quantities of other dangerous articles such as gasoline, acids and corrosive liquids, inflammable liquids, inflammable solids, poisonous articles and compressed gases, with only two fatalities and injury

to ten persons. One fatality resulted from a fire following a derailment of a car loaded with cylinders of compressed acetylene gas. The other fatality occurred in connection with a collision involving a tank car loaded with gasoline.

The total property loss in 1939 incidental to the transportation and storage on railway property of explosives of all kinds and of dangerous articles other than explosives amounted to \$116,211, which was less than in any year since the Bureau of Explosives started its work in 1907. Of that amount \$48,704 was chargeable to gasoline fires in tank cars. In 1938 the total property loss amounted to \$294,555, of which \$231,982 was chargeable to gasoline fires.

Attorney General Favors Bill to Make Train-Wrecking a Crime

Senator Ashurst, Democrat of Arizona and chairman of the Senate committee on judiciary, has received from Attorney General Jackson a letter endorsing S. 3202, the bill introduced by Senator King, Democrat of Utah, "to make it a crime to wreck or attempt to wreck a train engaged in interstate commerce." The Attorney General called the bill "desirable" and recommended enactment.

As noted in the *Railway Age* of January 27, page 226, an identical bill, H. R. 8086, has been introduced in the House by Representative Walter, Democrat of Pennsylvania; they provide that anyone convicted in connection with a wreck which resulted in the death of any person would be subject to the death penalty or imprisonment for life—others convicted would be subject to a maximum fine of \$10,000 or 20 years imprisonment, or both.

Advisory Committee for Port Control Plan

The advisory committee which will assist G. C. Randall, manager of port traffic, in his work of controlling movements through North Atlantic ports has now been appointed, according to an announcement from W. C. Kendall, chairman of the Car Service Division, Association of American Railroads. Members of the committee are: F. J. Couse, foreign freight traffic manager of the Baltimore & Ohio; H. O. Lynch, foreign freight agent of the Boston & Albany; R. C. Creager, foreign freight agent of the Chesapeake & Ohio; G. N. Whelpley, foreign freight agent of the Lehigh Valley; A. J. Ball, foreign freight traffic manager of the Pennsylvania.

Minton Assails Lack of Competitive Bidding

Senator Minton, Democrat of Indiana and a member of the Interstate Commerce Committee, in speaking in the Senate on March 11, criticized certain railroads for their failure to offer new bond issues at competitive bidding and called his colleagues' attention to the fact that recently Senator Truman, Democrat of Missouri, had pointed out that the Louisville & Nashville had sold an issue of bonds to a New York banking house at less than par after another banking house had offered to bid par for them.

"There has been called to my attention,"

he said, "another circumstance of similar import. It seems that the Elgin, Joliet & Eastern Railway are offering an issue of \$20,000,000 of their bonds. They likewise have been offered par for the bonds; but, notwithstanding the fact that they have been offered par for the bonds, they propose to accept 99½ per cent from their bankers in Wall Street."

"Mr. President," the Senator from Indiana concluded, "so long as the railroads of the country are asking the Government of the United States to help them solve their problem—and they have a problem—it seems to me they should be doing something about putting their own house in order. It seems to me the least they should do is to try to get for the bonds they sell all that they can get and not be favoring some Wall Street banker by means of a cut on their bond issues."

Suspends Mississippi-New Orleans Rates on Naval Stores

The Interstate Commerce Commission has suspended from March 9 until October 9 the operation of schedules wherein the New Orleans & Northeastern (part of Southern) is proposing to bring its rates on naval stores from Hattiesburg, Miss., and Laurel to New Orleans in line with other adjustments between Southern Mississippi points and Gulf of Mexico ports approved by the commission in the recently-decided Naval-Stores-to-Gulf-Ports case. The commission now has before it several petitions for rehearing and reconsideration of that decision (No. 27571, embracing also I. & S. No. 4265) which was reviewed in the *Railway Age* of February 3, page 254.

The new proceeding involving the suspension of the reduced Hattiesburg-New Orleans and Laurel-New Orleans rates published for the account of the New Orleans & Northeastern is docketed as I. & S. No. 4772.

Westchester Towns Vote Money for N. Y. W. & B. Survey

Cities in Westchester county, New York, along the line of the now defunct New York, Westchester & Boston have voted a total of \$12,600 for a survey by the Port of New York Authority on the possibility of reviving the electric suburban railroad. According to a formula based on assessed property valuations of the communities, White Plains will contribute \$3,600, Mount Vernon \$4,000 and New Rochelle \$5,000. It is expected also that Scarsdale will advance \$1,800 and Pelham \$1,300. It is reported that the Port of New York Authority has agreed to undertake the survey if \$18,000 can be raised.

Senate Committee Approves Bill to Change Titles of Boiler Inspectors

The Senate committee on interstate commerce has reported favorably the bill (S. 3440) introduced by Chairman Wheeler to change the titles of the chief inspector and assistant chief inspectors of locomotive boilers, respectively, to director of locomotive inspection and assistant directors of locomotive inspection.

The committee report included a letter written to Senator Wheeler by Chairman

Eastman of the Interstate Commerce Commission's legislative committee, which approves the bill. The Eastman letter points out that the heads of the other I. C. C. bureaus with the exception of the Bureau of Administration, which is in charge of the secretary, have the title of director.

"This difference in titles," Mr. Eastman goes on, "has caused some misunderstanding on the part of the public and some embarrassment to those in charge of the work of the Bureau of Locomotive Inspection. A bureau which is engaged in quite similar work is the Bureau of Safety. It has in fact nothing to do with the work of the Bureau of Locomotive Inspection, but because its head has the title of director whereas the head of the Bureau of Locomotive Inspection has the title of chief inspector, communications which should go direct to the latter bureau are at times addressed to the Bureau of Safety, with the thought that it has authority over the Bureau of Locomotive Inspection and that the chief inspector of the latter is subordinate to the director of the former."

W. J. Besler Receives Modern Pioneer Award at San Francisco

William J. Besler, vice-president, Besler Systems, Oakland, Cal., manufacturers of high-pressure steam equipment and the Besler vacuum power brake, was among those who were nominated "Modern Pioneers" by the National Association of Manufacturers at a regional dinner in San



William Besler

Francisco, Cal., recently. Mr. Besler was cited chiefly for his development of high-pressure steam power plants on which he has been issued five patents and has nine applications pending and for his development of vacuum brakes for automotive service on which he has been granted eight patents, with two additional pending. His chief contribution to the railroad field was his design and installation of a high-pressure steam plant for a two-car train of the New York, New Haven & Hartford in 1936, now in operation between Bridgeport, Conn., and Waterbury, which was

described in the *Railway Age* of October 24, 1936.

Mr. Besler, who is the son of W. G. Besler, chairman of the board, Central of New Jersey, was born in 1904 in Plainfield, N. J., and was graduated from Princeton University in 1926. He sustained a leg injury in college sports and to make it possible for him to drive a car, soon after graduation successfully installed a power brake of his own design on his automobile. Commercial possibilities were seen therein, and in collaboration with his brother, George, he developed the Besler power brake for heavy trucks and trailers. His interest in steam power dates back to the age of 12 when he outlined a simple application of a steam engine to a boy's "bucketboard-type coaster."

High Court Upholds Indiana Weight Tax Law

The United States Supreme Court, at its March 11 meeting, dismissed the petition of an Indianapolis truck driver challenging the constitutionality of the Indiana Motor Vehicle Weight Tax Law, thereby making final the decision of the Supreme Court of Indiana which sustained the validity of the statute. The Indiana Supreme Court had found that the weight tax which is imposed upon trucks, tractors, trailers, semi-trailers, or motor buses based upon the weight, size and construction of the motor vehicles is not unconstitutional despite the fact that an exemption is granted passenger vehicles with trailers attached, the court holding that the exemption was based on a reasonable classification.

W. E. Dunham Takes Editorial Assignment

In the new edition of the Car Builders' Cyclopedia, compiled and edited for the Association of American Railroads, Mechanical Division, by the Simmons-Boardman Publishing Corporation, and expected to be ready for distribution early this fall, more space will be devoted to car repair shop layouts, machine equipment and methods of operation necessary to meet modern requirements. Section 19 of the Cyclopedia on "Car Shops and Car Maintenance," will accordingly be rewritten and enlarged, and arrangements been made to have this done by W. E. Dunham, who recently retired as superintendent of the car department of the Chicago & North Western and the Chicago, St. Paul, Minneapolis & Omaha. Mr. Dunham, whose career was outlined in the *Railway Age* of February 3, 1940, page 271, will bring to his assignment an intimate and extensive knowledge of all phases of railway car maintenance.

Southwest Board Sees Traffic Decline

A decrease of 4.4 per cent in carloadings in the territory of the Southwest Shippers Advisory Board during the second quarter of 1940 as compared with the same period in 1939, was forecast at a regular meeting of the board at Beaumont, Tex., on March 7. The meeting opened with a luncheon sponsored by the Sabine District Traffic Club at which Col. Ernest O. Thompson, commissioner of the Railroad Commission

of Texas, spoke on Texas Oil—Its Importance to Texas. Pending legislation, the proposed St. Lawrence waterway and activities of shippers and railroads to speed up overseas shipments and at the same time prevent congestion at Gulf posts were among the subjects discussed. Preparations for conducting the April Perfect Shipping and Careful Handling Month Campaign were completed and committees of local railroad and industrial representatives have been organized in all the larger southwestern cities to conduct the campaign.

Freight Car Loading

Revenue freight carloadings for the week ended March 9 totaled 620,997 cars, the Association of American Railroads announced on March 14. This was a decrease of 13,413 cars, or 2.1 per cent, below the preceding week, but an increase of 32,571 cars, or 5.5 per cent, above the same week in 1939, and an increase of 64,267 cars, or 11.5 per cent, above the corresponding week in 1938.

As reported in last week's issue, loading of revenue freight for the week ended Saturday, March 2, totaled 634,410 cars, and the summary for that week, as compiled by the Car Service Division, A. A. R., follows:

Revenue Freight Car Loading For Week Ended Saturday, March 2			
Districts	1940	1939	1938
Eastern	141,681	134,729	122,793
Allegheny	131,264	117,409	104,265
Pocahontas	44,986	41,429	35,619
Southern	100,246	92,800	91,353
Northwestern ..	74,530	69,480	66,064
Central Western ..	94,869	95,204	86,190
Southwestern ..	46,834	43,373	46,608
Total Western Districts	216,233	208,057	198,862
Total All Roads	634,410	594,424	552,892
Commodities			
Grain and grain products	35,323	32,341	33,039
Live stock	11,131	9,636	10,697
Coal	129,904	125,027	106,709
Coke	10,031	7,414	5,884
Forest products ..	32,269	24,428	26,932
Ore	10,078	8,979	6,805
Merchandise l.c.l.	149,550	153,403	151,498
Miscellaneous ..	256,124	233,196	211,328
March 2	634,410	594,424	552,892
February 24	595,032	556,742	511,939
February 17	607,924	576,645	535,866
February 10	626,903	576,352	542,991
February 3	657,004	573,127	564,740

Cumulative Total,
9 Weeks 5,676,688 5,166,020 4,965,145

In Canada.—Carloadings for the week ended March 2 totaled 48,348 cars, as compared to 46,475 in the previous week and 41,164 in the corresponding week last year according to the compilation of the Dominion Bureau of Statistics.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada:		
March 2, 1940	48,348	25,116
February 24, 1940	46,475	23,941
February 17, 1940	45,400	22,910
March 4, 1939	41,164	22,325
Cumulative Totals for Canada:		
March 2, 1940	425,490	215,869
March 4, 1939	359,010	190,059
March 5, 1938	405,555	197,561

Club Meetings

The Railway Club of Pittsburgh, Pa., will hold its next meeting on March 28 at the Fort Pitt hotel, Pittsburgh. Dr. L. O. Grondahl, director, research and engineering, Union Switch & Signal Co.,

Swissvale, Pa., will present a paper entitled "Train Communication and Its Uses in Railway Operation." The meeting will be preceded by a dinner at 6:30.

The New England Railroad Club will hold its annual meeting on March 19 at the Hotel Touraine, Boston, Mass. Dr. Phillips Thomas, research engineer, Westinghouse Electric & Manufacturing Co., will speak on "New Horizons of Science."

The Eastern Association of Car Service Officers will hold its regular spring meeting at the Pennsylvania hotel, New York, on March 28, at 10:15 a. m.

The New England Shippers Advisory Board has postponed its meeting scheduled to be held at the Copley-Plaza hotel, Boston, Mass., March 13 and 14, to April 5, at the same place. The change of meeting does not interfere with the originally-scheduled meetings of the Loss & Damage Prevention committee.

The Metropolitan Traffic Association of New York will hold its 13th annual dinner at the Pennsylvania hotel, New York, on April 11, at 6:30 p. m.

Employees Ask Massachusetts' Assent to B. & M. Bond Plan

The general chairmen of 19 standard railroad unions, representing 12,000 employees of the Boston & Maine, have appealed to high officers of the Commonwealth of Massachusetts for assent by the state, which owns \$9,100,000 of B. & M. bonds, to the railroad's plan of exchange which is designed to place it on a firm financial footing without resort to bankruptcy proceedings. The statement of the employees' representatives pointed out in part that "the successful consummation of the Boston & Maine plan is a matter of vital interest to the more than 12,000 employees of the railroad and that the Commonwealth of Massachusetts do everything it can to co-operate in keeping this road out of bankruptcy, not only by assenting to the plan with respect to the bonds owned by the Commonwealth, but by taking new first mortgage bonds under the plan instead of cash. . . . 'our members have a keen interest in seeing that the present bonds of the railroads are not dealt with in some drastic reorganization involving court proceedings, with the delays and expenses consequent thereto.'"

W. E. Hurley, treasurer of Massachusetts, announced on March 8 that he would agree to the state's entering the voluntary reorganization plan and that he would write a letter to Governor Saltonstall and Attorney-General Dever reporting his decision. He stressed that the approval of the governor and Council and attorney-general are necessary before the state can take action.

I. C. C. Refuses Rehearing in Southern Governors Case

Finding no reason warranting re-argument or further hearing, the Interstate Commerce Commission has disposed of petitions for a re-opening of the so-called Southern Governors rate case in another five-to-four decision which undertakes to modify prior findings to the extent necessary to eliminate unintended results flowing from situations wherein the new South-

North interterritorial rates would be lower than the intraterritorial rates on the same commodities for like distances between points in the North.

"Upon further consideration of the records," says the majority report by Commissioner Lee, "we are of the opinion that for the purpose of specifying in the report the exact rates found reasonable appropriate percentages of constructive first-class rates determined by application of the first-class distance scales prescribed in Eastern class-rate investigation, increased by 10 per cent, with provision for reasonable groupings of origin and destination points, should be prescribed in place of the percentages of the contemporaneous first-class rates shown in the original report."

Chairman Eastman, who in his dissent to the original report (see *Railway Age* of December 9, 1939, page 889), called the controversy "a political issue" that "has in effect been decided in advance and without regard to the record, by many men in public life of high and low degrees", also filed a brief dissenting expression to the supplemental report. The changes which the latter makes, he said, "are improvements"; but they "do not remove the objections. . . . which were presented in the dissenting opinions attached to the prior report". The Chairman, with whom Commissioners Porter, Mahaffie and Miller agreed, would have granted the petitions for reconsideration. Commissioners Alldredge and Patterson did not participate.

President Opposed to New Rivers and Harbors Authorizations

President Roosevelt is opposed to any new rivers and harbors or flood control authorizations at this session of Congress, according to Senator Bailey, Democrat of North Carolina and chairman of the Senate committee on commerce, who headed the delegation from that committee which conferred with the President on March 13. As noted in the *Railway Age* of March 2, page 424, the delegation consisting of Chairman Bailey, Senator Sheppard, Democrat of Texas, and Senate Minority Leader McNary, Republican of Oregon, was recently named by the committee to seek the President's advice with respect to the pending rivers and harbors bill—H. R. 6264 which passed the House at the last regular session with authorizations totaling \$83,000,000 and was reported from the Senate commerce committee as a \$412,000,000 measure.

The latter was recommitted and the committee's reconsideration of it brought forth the decision to name the delegation to confer with the President. "The President told us very candidly that his counsel is adverse to further authorizations of rivers and harbors and flood control works at this session," Senator Bailey said upon leaving the White House. He added that the President had based his position "on the fact that there already is a huge backlog of authorizations."

In the latter connection Mr. Bailey estimated that it would take approximately \$250,000,000 to complete work on projects now begun; and that the total estimated cost of all authorized projects—both active and inactive—would approximate a billion

dollars. Thus Congress can do quite a bit of appropriating before it runs short of authorizations on which to work.

I. C. C. Issues Warehousing-Probe Questionnaire

Getting under way with its No. 28420 investigation of warehousing and storage practices at North Atlantic ports, other than New York, the Interstate Commerce Commission, Division 3, has issued a questionnaire, returnable May 11, calling for data from carriers serving Baltimore, Md., where, as Secretary Bartel's original notice said, the probe will begin. Thus the railroads involved at this stage are the Baltimore & Ohio, Pennsylvania, Western Maryland and Canton.

The questionnaire states at the outset that no information need be furnished with respect to the storage or handling of coal or grain; and "it is not proposed to give particular attention in this proceeding to the involuntary storage ordinarily performed by railroads as part of their common-carrier obligation, except that in order to facilitate allocation it will be desirable to show the extent to which any facility used for voluntary storage is used for any other purpose."

The "full information" required is called for under the following headings:

- (1) The description, location, storage capacity and equipment of each of the warehouses, buildings, piers and facilities in which warehousing, storage or handling of goods for shippers in interstate or foreign commerce is afforded or performed by your company or its affiliated or subsidiary companies.
- (2) The cost or present value of the warehouses, buildings, piers and facilities above-mentioned, and the manner in which such cost or value was determined.
- (3) If the above or any other warehouses, buildings, piers or facilities used for storage or handling of goods are leased to or by your company, the annual rental paid or received.
- (4) The total volume of goods stored in each such warehouse, building, pier or facility, separated by commodities, during the calendar year 1939, or if more readily available, this information may be furnished for the 12-month period ended September 30, 1939.
- (5) The period during which the storage mentioned in the preceding paragraph extended, the figures to be shown separately for each commodity.
- (6) The storage and handling charges collected on each commodity during the above-mentioned 12-month period and the rate or rates at which the storage and handling charges, stated separately, were computed.
- (7) The service, in detail, performed in connection with the storage, including the amount and nature of handling.
- (8) Details of the cost per ton of storing and handling goods in said warehouses, buildings, piers and facilities.

Minimum Wage Hearings Are Concluded

Hearings before the Railroad Industry Committee were concluded on March 7, but the committee will resume its sessions on May 3 when counsel for the various interests will orally argue the issues involved. Upon the completion of the oral argument the committee will go into executive session to attempt to reach some sort of decision. The Railroad Industry Committee of the Wage and Hour Division, Department of Labor, has been holding hearings during the past three weeks to determine its recommendations as to the future minimum wages on the railroads (up to a possible level of 40 cents an hour) which "will not substantially curtail employment."

At the March 6 session of the committee

C. D. Cass, attorney for the American Transit Association, representing street and electric interurban railways, took the position that the street railways are exempt from the application of the Fair Labor Standards Act, and that some interurban electric lines are exempt, while others are not. Mr. Cass did not know where the dividing line was, but expressed the hope that the committee would make some determination along this line. He also told the committee that those lines which are not exempt are not in a position to pay any increase in wages to any of their employees.

The last day of the hearing was devoted entirely to rebuttal testimony on behalf of the carriers by Dr. Julius H. Parmelee, director of the Bureau of Railway Economics of the Association of American Railroads, and Robert Faries, assistant chief engineer of the Pennsylvania, and to the introduction of certain statistical data on the status of the employees of the Pullman Company, Railway Express Agency, and the private car companies by Edward B. Mittleman, economist for the Wages and Hours Administration.

December Accident Statistics

The Interstate Commerce Commission's completed statistics of steam railway accidents for the month of December, 1939, now in preparation for the printer, will show:

Item	Month of 12 mos. ended December with December			
	1939	1938	1939	1938
Number of train accidents	580	469	6,074	5,682
Number of casualties in train, train-service and nontrain accidents:				
Trespassers:				
Killed	129	145	2,294	2,298
Injured	124	122	2,290	2,429
Passengers on trains:				
(a) In train accidents:				
Killed	...	...	13	52
Injured	104	41	776	475
(b) In train-service accidents:				
Killed	3	3	14	17
Injured	164	137	1,727	1,797
Travelers not on trains:				
Killed	3	...	13	9
Injured	72	73	817	736
Employees on duty:				
Killed	37	39	499	479
Injured	1,540	1,529	16,957	16,163
All other nontrespassers:				
Killed	173	228	1,529	1,644
Injured	664	633	5,552	5,653
Total—All classes of persons:				
Killed	345	415	4,362	4,499
Injured	2,668	2,535	28,119	27,253

* Train accidents (mostly collisions and derailments) are distinguished from train-service accidents by the fact that the former cause damage of more than \$150 to railway property.

† Casualties to "Other nontrespassers" happen chiefly at highway grade crossings. Total highway grade-crossing casualties for all classes of persons, including both trespassers and nontrespassers, were as follows:

Number of accidents..	467	445	3,476	3,493
Persons:				
Killed	162	222	1,398	1,517
Injured	534	482	3,999	4,018

Rivers and Harbors Congress Meets in Washington

The 35th annual convention of the National Rivers and Harbors Congress met in Washington, D. C., on March 14 and 15. Among those scheduled to address the Congress were Major General Julian L.

Schley, chief of the Army Engineers; United States Senator Josiah W. Bailey, Democrat of North Carolina; Rear Admiral Emory S. Land, chairman of the United States Maritime Commission; Chester C. Thompson, president of the Inland Waterways Corporation; and Representative Clarence F. Lea, Democrat of California and chairman of the House interstate and foreign commerce committee.

Prior to the actual opening of the Congress on March 14, the projects committee met on March 12 and 13 to "select for endorsement the country's meritorious projects from the hundreds that have been submitted for study and consideration from all parts of the United States." As a justification for this pre-study of projects, it is pointed out that the projects committee in the past five years has considered nearly 1,000 projects, endorsing only 281.

A pre-convention announcement from the Congress states that "With the moot Wheeler-Lea bill, which would place jurisdiction of the waterways within the Interstate Commerce Commission along with railroads, now in conference on Capitol Hill, the projects committee this week expected to repeat and expand its last year's declaration 'that the continuing and obstructing opposition of the railroads to the expansion of water transportation constitutes a menace to the welfare and security of the United States and is largely responsible for high transportation costs and consequent unbalancing of production and consumption'."

Fingerprinting Reduces Trespassing on M. P.

Increased vigilance of Missouri Pacific employees and continuation of a policy under which hoboes taken from trains are fingerprinted by local law enforcement officers were instrumental in sharply reducing the number of persons stealing rides in 1939. In 1939, a total of 67,007 persons were apprehended on Southern and Western district property, as compared with 73,620 in 1938.

The vast majority of those apprehended, 66,341, were merely told that they were trespassing on private property, that their presence imposed a distinct liability to the railroad, and that the sooner they moved elsewhere the better. However, 666 of them were tried in various tribunals, and all except 6 of these were convicted. Their fines totaled \$11,290, and their sentences aggregated 434 years and two months.

Special officers of the Texas Lines apprehended 18,530 trespassers, of whom 16,636 were released, and 1,894 were hailed into court and convicted. Fines levied against trespassers totaled \$22,200. In addition, fines totaling \$1,973 were assessed against 133 persons arrested on the property and charged with offenses other than trespassing. Sentences of trespassers and others totaled 188 years and eight months.

The reduction in the number of trespassers was accompanied by a substantially similar reduction in the total claims charged to theft. Western and Southern district figures, for the first 10 months of the year, show that these claims totaled \$12,672, of which 77 per cent or \$9,733 were coal

claims, as against a total of \$20,645 for the same period in 1938, of which \$12,449 was chargeable to coal claims.

Special agents and officers traveled 22,385 freight-train miles protecting valuable items in transit during the year, and approximately 46,000 passenger train-miles accompanying and protecting federal deportee movements. Stolen freight and railroad property valued at \$6,615 was recovered during 1939, and a total of 8,721 stations were visited in the interest of claim prevention.

Eastern Roads Adopt New "Sliding-Scale" Round-Trip Fares

When the new two-cents-a-mile basic one-way coach rate of the Eastern railroads ordered by the I. C. C. goes into effect March 25, there will also be offered between points in Trunk Line and Central passenger association territories a new "descending scale" of round-trip coach fares according to which a two-cent rate will apply for the first 100 miles of one-way distance, graduated downward until a fare of 1.5 cents per mile is reached for one-way distances of over 900 miles. Decision to adopt the sliding-scale return fares was reached at a meeting of the chief passenger traffic officers of the Eastern roads on March 12, following many weeks of conferences in which, it is believed, the Baltimore & Ohio argued for a straight round-trip basis as low as 1.5 cents while other trunk lines sought to eliminate reductions for round-trips altogether. The "descending-scale" as adopted is probably a compromise.

It is similar in principle to the sliding-scale round-trip rates placed in effect June 30, 1939, by the Eastern lines (with the exception of the New England roads) which diminished by 50-mile blocks from a base of 2.25 cents per mile for one-way distances up to 100 miles to a minimum of 1.7 cents for 901 miles and over. The latter fare basis expires automatically along with the 2.5-cent one-way rate on March 24. By reason of a lower base, the new "descending scale" rates result in substantial reductions under the present scale, as is illustrated by typical round-trip fares from New York:

To	Present	Reduced
Philadelphia	\$4.05	\$3.60
Baltimore	8.10	7.10
Washington	9.65	8.10
Buffalo	16.25	13.50
Pittsburgh	17.70	14.10
Cleveland	22.00	17.15
Cincinnati	26.90	22.55
Chicago	30.90	27.25
St. Louis	36.00	31.75

The New York, New Haven & Hartford, which does not participate in the present sliding-scale round-trip rates (it offers a straight 2.25-cent return rate) is not a party to the new "descending scale" and has announced that, effective March 25, round-trip coaches fares will be simply double the one-way rate of two-cents. The road will continue, however, to offer its present special one-day and week-end excursion rates.

Opposes Refrigerator Car Bill

Representative Anderson, Democrat of Missouri, put into the appendix to the March 7 issue of the Congressional Record

a study which he had had made "of the possible effect of H. R. 8242, a bill designed to compel the railroads to accept cars supplied by shippers of certain products." The measure is the so-called refrigerator car bill introduced by Representative Ferguson, Democrat of Oklahoma, as noted in the *Railway Age* of February 10, page 297; it is similar to S. 2753 previously introduced in the Senate by Senator Shipstead, Farmer-Laborite of Minnesota, and now pending before the Senate committee on interstate commerce which has received a favorable report from a sub-committee headed by Mr. Shipstead.

The bills which would give shippers of fresh meats, packing-house products or dairy products the right to furnish their own refrigerator cars are designed to counteract the Car Service Division's action of last May 5, reserving for railroads the right to furnish railroad-owned or railroad-controlled cars for such traffic. In a notice issued March 6, Chairman W. C. Kendall of the Car Service Division announced the further postponement from March 31 until June 30 of the effective date of the policy outlined in that May 5, 1939, circular; the extension, like the previous one from December 31 to March 31, is "to give additional time for negotiations which are being progressed as rapidly as practicable for distribution of private line equipment."

The study offered by Mr. Anderson points out that less than 3,000 cars are involved; and "in fairness and equity to the car lines which own this equipment, negotiations are under way to acquire their ownership at a fair price." Enactment of the above bills, the study goes on, would restore the situation which the Car Service Division action has cleared up; and such restoration would bring with it "the possibility of hundreds of private car lines serving no useful purpose, but resulting in much unnecessary specialization and expense on the part of the railroads and the setting up of rebates in the form of excessive mileage earnings which already has been condemned by the Interstate Commerce Commission."

Representative Anderson also inserted a letter written on July 17, 1939, by Chairman Eastman of the I. C. C.'s legislative committee to Chairman Wheeler of the Senate interstate commerce committee. The Eastman letter said the Shipstead refrigerator car bill should not pass—in the opinion of the I. C. C. committee it would be "from all points of view a move in the wrong direction."

Hull Says St. Lawrence Treaty Wouldn't Affect Neutrality

"The conclusion of a treaty with Canada for the development of the Great Lakes—St. Lawrence Basin project would not affect in any way the complete neutrality of the United States," Secretary of State Hull told Representative Kilburn, Republican of New York, in a letter responding to the Congressman's request for an "official statement" on the matter. Mr. Kilburn thought that from the Secretary of State's reply, which he inserted in the March 7 issue of the Congressional Record, it could "be readily seen that the

opponents of the St. Lawrence seaway project are attempting to mislead the public."

Into the March 8 issue of the Record, Senator Gibson, Republican of Vermont, inserted a Montreal dispatch to the Washington (D. C.) Post, headed "The Great St. Lawrence Project—Premier Hepburn of Ontario Now Supports It." Meanwhile Secretary Hull has received a letter from Representative Van Zandt, Republican of Pennsylvania, which the latter put into the March 11 issue of the Record. In offering the letter Mr. Van Zandt asserted that opposition to the seaway project "is mounting daily as the people of the nation begin to appreciate the fallacy of this project which is bound to displace many American workmen under the guise of supplying cheap electrical power and transportation rates which will ultimately be indirectly paid for by the American taxpayers." "The high cost of these cheap rates," the Pennsylvanian went on, was alluded to in his letter to Secretary Hill which he was offering as an extension of his remarks.

In that same March 11 issue Representative Schwert, Democrat of New York, extended his remarks to insert opposition resolutions which had been adopted by the Central Council of Citizens and Taxpayers Association of Cheektowaga, N. Y., and the Niagara Frontier Planning Board of the Board of Supervisors, Niagara County, N. Y. In the March 12 issue appeared an extension of remarks by Representative Pittenger, Republican of Minnesota, whose essay was on the "Unfounded Objections of Lake Carriers Association to St. Lawrence Seaway Project."

Senator Wheeler Takes the Air

(Continued from page 522)

public utility upon the valuation of which interest must be paid, and profits made." Nevertheless, he added, there "is still a long way to go" in highway improvements; but "their cost must be kept within the ability of the user to pay and he earns, on an average, less than \$30 a week." In conclusion Mr. Gray called for less thinking "about the welfare of the types of transportation" and more thought "about the fellow who pays the freight."

"Waterways are Nature's highways," said Chairman Driver of the National Rivers & Harbors Congress, who then proceeded through brief introductory remarks to a review of the post-war revival of inland waterways. The reason for this growth, he said, is "that water transportation meets public demands which other methods do not meet." He went on to deal with contentions that consumers pay the same price "whether the commodity moves cheaply by water or expensively by rail." "The War Department has investigated this claim and confirms its literal truth but disproves the further claim that the difference is pocketed by the middleman and not passed on," Mr. Driver explained. "The aggregate freight bill paid in the distribution of a commodity both by rail and water is one of the elements of

production and in the measure that it is made less costly by water transportation, its base price all over the country is reduced. This basic fact results in the uniform distribution of the benefits of water transportation throughout the land instead of permitting only the consumer who is located at a river port to benefit."

Mr. Driver also complained of rate reductions by railroads to meet waterway competition, claiming that railroad success in such efforts leaves the waterways without their "full share" of traffic—thus comes a "misleading picture of the importance" of the waterways. "The public," he added, "gets the benefit of these reductions but the waterway does not get the traffic. If all the traffic on all the reduced rates for which waterways are responsible were included there would be a very different showing."

In his March 12 address, Senator Wheeler stressed the importance of "a sound transportation system" to the national defense, and went on to talk about pending transport bills which he is sponsoring. Included were S. 2009, the bill to create a special railroad reorganization court, and the so-called "strait-jacket" bill which would give the I. C. C. regulatory authority over "outside investments" of railroads. S. 2009, he said, "is designed to establish equality of regulation for competing carriers;" the court bill would centralize responsibility for "sound reorganization" of railroads, relieving the present federal judges of a task "for which they are not especially trained;" and the strait-jacket bill "would in some measure prevent the recurrence" of "wastes and abuses" brought to light in the Senator's investigation of railroad finances. Mr. Wheeler is hopeful that Congress will enact all three of these bills "before this session is concluded."

"Trade Barrier" Hearings to Begin March 18

The Department of Commerce has announced through the Temporary National Economic Committee (Monopoly Committee) that it will hold public hearings before the Committee on the subject of interstate trade barriers beginning March 18. The hearings are expected to continue for five days, with morning and afternoon sessions, through March 22. The evidence will be presented by the Department of Commerce under the direct supervision of the Interdepartmental Committee on Interstate Trade Barriers, which committee is composed of representatives of nine governmental agencies.

Paul T. Truitt, chairman of the Interdepartmental Committee and assistant to Secretary of Commerce Harry L. Hopkins, will direct the presentation. He will be assisted by Haskell Donoho, assistant to the Solicitor of the Department of Agriculture, who will act as council and conduct the examination of witnesses.

Among the witnesses scheduled to testify are John V. Lawrence, general manager of the American Trucking Associations, Inc.; Leon F. Banigan, managing director of the National Council of Private Motor Truck Owners, Inc.; A. W. Koehler, secretary manager of the National Association of Motor Bus Operators; and Russell

Singer, general manager of the American Automobile Association.

Meanwhile, the National Bureau of Standards, Department of Commerce, "is cooperating with business men in an effort to eliminate the interstate trade barrier problem created by widely differing state regulations governing lighting and signaling equipment used on trucks and buses," according to Lyman J. Briggs, Bureau Director.

"Varying laws in the several states have become a matter of great inconvenience, annoyance and expense to operators of interstate commercial vehicles," according to Mr. Briggs. In many instances, he states, drivers after passing through one state must remove and replace colored lamps and lenses in their system of running lights. It is also asserted that the states that require approval of equipment to be used on vehicles traversing their highways charge from \$15 to \$150 per model for issuing approval certificates, in addition to fees for laboratory tests.

The announcement states that a conference sponsored by the Bureau of Standards was held in Washington, D. C., at which manufacturers, laboratories, distributors, State administrators and consumers were represented. The conference went on record in favor of the adoption of uniform requirements for the following items: Adverse weather lamps, electric direction signals, inner-controlled spotlamps, tail lamps, stop lamps, license-plate lamps, red electric warning lanterns and liquid burning flares.

Construction

ALTON.—A contract amounting to \$30,756 has been awarded H. J. Eppel, Pontiac, Ill., by the State of Illinois Division of Highways for the construction of a three-span I-beam bridge on this road over a highway at Pleasant Hill, Ill. The bridge will consist of two spans 67 ft. 6 in. long and one span 86 ft. 8 in. long, resting on reinforced concrete piers and abutments. A contract for the fabrication and delivery of the structural steel for this bridge, amounting to \$6,826, was awarded the Midland Structural Steel Company, Cicero, Ill.

CHICAGO, BURLINGTON & QUINCY.—A contract amounting to \$23,402 has been awarded the Charles B. Cochran Corporation, Marion, Ill., by the State of Illinois, Division of Highways for the construction of a bridge on this road over a highway at Neilson, Ill. The new structure will consist of three I-beam spans, two 47 ft. 6 in. long and one 61 ft. long, supported on reinforced concrete piers and abutments. A contract for the fabrication and delivery of the steel for this structure, amounting to \$3,948, was awarded to Wendnagel & Company, Chicago.

ST. LOUIS-SAN FRANCISCO.—A contract amounting to \$42,000 has been awarded the List Construction Company, Kansas City, Mo., for grading along the Mississippi river bluffs between Rush Tower, Mo.,

and Ste. Genevieve. Material excavated from sliding locations at the foot of the bluffs is being used for widening embankments on the river side of the track and in some places the track will be lined over away from the bluffs.

LONG ISLAND.—This company has given a general contract to Tully & DiNapoli, Inc., Long Island City, N. Y., for the elimination of grade crossings at Rockaway Beach, N. Y., from Hammel to Rockaway Park, involving 9,500 tons of steel.

TENNESSEE.—Division 4 of the Interstate Commerce Commission has dismissed for want of jurisdiction the application of this company for authority to construct a line of railroad in Campbell County, Tenn.

Supply Trade

Johns-Manville Corporation

The annual report of the Johns-Manville Corporation for 1939 shows a net income of \$4,164,718, as compared with \$1,455,302 in 1938. Net sales totaled \$53,847,177, an increase of \$6,957,209, or 15 per cent, as compared with 1938.

General American Transportation Corporation

The annual report of the General American Transportation Corporation and its subsidiaries for 1939 shows a net profit of \$3,214,043 as compared with \$3,004,899 in 1938. Gross income from sales and rentals totaled \$27,820,624, compared with \$27,090,181 in 1938, leaving an operating profit before depreciation of \$10,319,161. Current assets totaled \$13,549,242 and current liabilities \$4,827,604.

Westinghouse Electric & Manufacturing Annual Report

The Westinghouse Electric & Manufacturing Co., according to its annual report for the year ended December 31, 1939, earned a net income during the year of \$13,854,365, compared with \$9,052,773 in 1938, an increase of 53 per cent. Dividends totaling \$9,349,241 were paid during the year, or \$3.50 per share on preferred and common stock.

Orders received during 1939 amounted to \$214,239,044, compared with \$149,662,776 for the previous year, an increase of 43 per cent. Net sales billed during the year totaled \$175,071,363, compared with \$157,953,216 in 1938, an increase of 11 per cent. Unfilled orders on hand December 31, 1939, amounted to \$70,821,960, compared with \$40,188,150 at the end of 1938, an increase of 76 per cent. In their report to the stockholders, A. W. Robertson, chairman, and G. H. Bucher, president, pointed out that when general conditions improved during the last half of last year, the company's business increased rapidly, and that incoming orders for the year reached the third highest level in Westinghouse history, being exceeded only in 1929 and 1937.

William H. Richardson, general manager of the service-sales division of the

Timken Roller Bearing Company, Canton, Ohio, has been appointed assistant general sales manager, a position created because of the company's increased activity in the sale of bearings for general industrial use. Mr. Richardson has been succeeded by **E. H. Austin**, assistant general manager of the sales-service division. **R. P. Proffit**, representative at Chicago, has been promoted to Chicago division manager.

Jay Irwin has been appointed Chicago district manager of the steel and tube division of the **Timken Roller Bearing Company**, Canton, Ohio.

J. S. Thompson, salesman in the Chicago office of **The Babcock & Wilcox Tube Company**, Beaver Falls, Pa., has been appointed district sales manager of the Chicago office.

William H. Armstrong, manager of tie tamper sales of the **Ingersoll-Rand Company**, with headquarters at New York, will retire on September 1, and will be succeeded by **Winton J. Heinz**, central manager of tie tamper sales, with headquarters at Cleveland, Ohio. In the meantime Mr. Heinz will be located in New York. Mr. Armstrong was born on February 19, 1874, in Dublin, Va., and was educated at Virginia Polytechnic Institute, graduating in 1893 with a degree in mechanical engineering. During the early years of his career Mr. Armstrong served in various capacities on the Norfolk & Western and later was connected with the Richmond Locomotive Works. In 1901 he



Kalden Kazanjian Studios

Wm. H. Armstrong

went with the Chicago Pneumatic Tool Company as assistant manager of the Chicago office and purchasing agent, subsequently being sent to New York as office manager. In 1903, he became identified with the Ingersoll Sargent Drill Company serving successively as assistant manager and manager of pneumatic tool sales. In 1905, the Ingersoll Sargent Drill Company was consolidated with the Rand Drill Company, to form the Ingersoll-Rand Company, and Mr. Armstrong continued with the new concern. He became manager of tie tamper sales in 1913, and pioneered in the introduction of pneumatic tie tampers on the railroads. Mr. Armstrong has been active in the affairs of a number of rail-

road clubs and associations and is a past president of the Track Supply Association.

TRADE PUBLICATIONS

WHITING CRANES.—The Whiting Corporation, Harvey, Ill., has published a sectional crane catalog with this title, describing in detail the structural features of the complete line of Whiting Tiger cranes, Gantry cranes and accessories, including detailed descriptions of the construction of various crane parts such as Whiting Tiger trolleys, bucket trolleys, crane hoist gearing, trolley drives, the type "R" solenoid brake, crane bridges, bridge drives, bridge trucks, bridge travel brakes, crane cages and blocks and hooks. The catalog also explains how to select a crane and presents tables of average crane speeds and of dimensions and clearances. Many photographs of various types of cranes in use, as well as photographs showing the equipment and construction features which are described, attractively illustrate this catalog.

Equipment and Supplies

LOCOMOTIVES

THE TENNESSEE CENTRAL is inquiring for from one to five locomotive tenders.

THE CHICAGO, ROCK ISLAND & PACIFIC has been authorized by the federal district court to spend \$1,528,000 for Diesel-electric locomotives and streamlined passenger cars.

THE DELAWARE, LACKAWANNA & WESTERN has placed orders for 14 Diesel-electric locomotives of 600 hp. The Electro-Motive Corporation has the order for 11 of these locomotives and the American Locomotive Company for 3.

FREIGHT CARS

THE CHICAGO, BURLINGTON & QUINCY is considering the construction of 100 70-ton covered hopper cement cars.

THE NASHVILLE, CHATTANOOGA & ST. LOUIS is inquiring for 200, 50-ton gondola cars and 50, 50-ton hopper cars.

THE NORTH WESTERN REFRIGERATOR LINE COMPANY, Chicago, is inquiring for 100 40-ton and 100 50-ton refrigerator cars.

THE ILLINOIS CENTRAL has ordered 62, 70-ton covered hopper cars from the General American Transportation Corporation.

IRON AND STEEL

THE LONG ISLAND grade crossing elimination project at Rockaway Beach, N. Y., from Hammel to Rockaway Park involves 9,500 tons of steel ordered from the Bethlehem Steel Co. Tully & DiNapoli, Inc., Long Island City, N. Y., has the general contract for this work.

Financial

ALLEN S. TRUX.—*Abandonment.*—This applicant has been authorized by Division 4 of the Interstate Commerce Commission to abandon the entire line of railroad formerly operated by the Mound City & Eastern, extending southeasterly from Long Lake, S. Dak., to Leola, 17.9 miles.

BOSTON & MAINE.—*Plan of Exchange.*—Extension to May 1 of the time in which to make operative the plan of exchange by which this road seeks to refinance outstanding bonds amounting to \$103,786,500 through voluntary co-operation of its bondholders, has been announced by W. S. Trowbridge, vice-president (finance). The plan, dated December 15, 1939, was to have become operative by March 15. In announcing the extension, he stated: "While a large number of bondholders have assented to the plan, there is still a substantial number who have not deposited their bonds or given their assents. Unless these bondholders co-operate promptly the plan cannot become operative."

CENTRAL OF NEW JERSEY.—*Lehigh & Susquehanna Rental.*—The trustees of the Central of New Jersey agreed on March 11 to make two rental payments amounting to \$850,000 to the Lehigh Coal & Navigation Co. before July 1 on account for rentals due on the Lehigh & Susquehanna, a subsidiary of Lehigh Coal, leased to the Central of New Jersey. In the agreement reached by the trustees of the Central and officers of Lehigh Coal and approved by the federal district court at Newark, N. J., it is stipulated that the C. N. J. pay \$425,000 to Lehigh Coal immediately and an additional \$425,000 on April 1, for the use of the L. & S. from January 1 to June 30. The entire rental under the lease agreement amounts to \$2,267,801 per annum plus minor adjusted charges. In addition, the Central trustees will pay all amounts due under the terms of the lease of the Wilkes-Barre & Scranton, amounting to approximately \$44,000.

By accepting these payments on account, Lehigh Coal & Navigation does not waive the right to recover the unpaid portions of the rentals and the agreement is without prejudice to the court petition which it has filed asking the right to proceed to collect the full rental or to resume operation of the L. & S. property directly.

The court at Newark also ordered that the Central trustees decide by June 1 on continuance or modification of the lease agreements.

CHICAGO, ROCK ISLAND & PACIFIC.—*Equipment Trust Certificates.*—This company has been authorized by Division 4 of the Interstate Commerce Commission to assume liability for \$20,400,000 of its 2½ per cent equipment trust certificates, maturing in 15 semiannual installments of \$1,360,000 on October 1 and April 1, from October 1, 1940, to October 1, 1947, inclusive. The issue has been sold at 100.8152942 to Salomon Brothers & Hutzler, making the average annual cost to the company approximately 2.28 per cent. The

proceeds will be used to retire \$20,413,500 of trustees' 10-year 3½ per cent certificates of indebtedness now outstanding, being the remainder of a total of \$26,883,550 of certificates issued as of July 1, 1937. The company estimates that the retirement will result in a saving in interest of approximately \$926,906.

CHICAGO UNION STATION.—*Bonds and Notes.*—This company has applied to the Interstate Commerce Commission for authority to issue and sell \$16,000,000 of 3½ per cent first mortgage bonds, series F, and to execute and deliver \$600,000 of 2½ per cent guaranteed notes to provide funds for the retirement of \$16,000,000 four per cent first mortgage bonds, series D. The application is joined by the Chicago, Burlington & Quincy; Chicago, Milwaukee, St. Paul & Pacific; Pittsburgh, Cincinnati, Chicago & St. Louis; and Pennsylvania who seek authority to guarantee the bonds and notes as to principal and interest. The series D bonds to be retired have been called for redemption July 1 at 105 per cent of par. Competitive bids have been asked on the refunding issues, and applicants will later advise the commission as to the best offer and the net amount of interest to be saved as a result of the refinancing.

COLORADO & SOUTHEASTERN.—*Abandonment.*—This company has asked the Interstate Commerce Commission for authority to abandon a line extending from Hastings, Colo., to Barnes, 2.7 miles.

DELAWARE, LACKAWANNA & WESTERN.—*New Director Elected.*—R. W. Lea, vice-president and director, Johns-Manville Corp., was elected a member of the board of managers of this road at the annual meeting of stockholders held February 20.

DETROIT & MACKINAC.—*Annual Report.*—The 1939 annual report of this company shows a net income of \$16,080, a decrease of \$23,673, as compared with net income in 1938. Selected items from the income statement follow:

	1939	Increase or Decrease Compared with 1938
RAILWAY OPERATING REVENUES	\$876,809	—\$1,047
Maintenance of way	129,267	—8,853
Maintenance of equipment	168,761	+29,496
Transportation	299,689	—6,543
TOTAL OPERATING EXPENSES	643,663	+13,063
Operating ratio	73.41	+1.58
NET REVENUE FROM OPERATIONS	233,145	—14,110
Railway tax accruals	43,708	+8,818
Railway operating income	189,437	—22,929
Equipment rents	56,713	—2,680
Joint facility rents	1,849	—236
TOTAL INCOME	135,327	—24,727
Interest on funded debt	114,280	—883
NET INCOME	\$16,080	—\$23,673

ERIE.—*Annual Report.*—The 1939 annual report of this company shows a net deficit, after interest and other charges, of \$1,449,521, as compared with net deficit of

\$10,777,793 in 1938. Selected items from the income account follow:

	1939	Increase or Decrease Compared with 1938
RAILWAY OPERATING REVENUES	\$81,217,363	+\$11,708,302
Maintenance of way	7,359,495	-31,443
Maintenance of equipment	16,121,165	+1,210,726
Transportation	30,733,210	+1,994,478
TOTAL OPERATING EXPENSES	59,372,910	+3,269,628
Operating ratio	73.10	-7.61
NET REVENUE FROM OPERATIONS	21,844,453	+8,438,674
Railway tax accruals	6,761,856	-38,613
Railway operating income	15,082,596	+8,477,287
Net rents—Dr.	3,618,460	+227,480
NET RAILWAY OPERATING INCOME	11,464,135	+8,249,807
Other income	1,120,867	+111,790
TOTAL INCOME	12,585,002	+8,361,597
Rent for leased roads and equipment	1,164,804	-826,445
Interest on funded debt	8,825,961	-2,514,869
TOTAL FIXED CHARGES	13,598,436	-775,305
NET DEFICIT	\$1,449,521	-\$9,328,272

FONDA, JOHNSTOWN & GLOVERSVILLE.—*Annual Report.*—The 1939 annual report of this company shows a net deficit, after interest and other charges of \$85,066, as compared with a net deficit of \$165,726 in 1938. Selected items from the income account follow:

	1939	Increase or Decrease Compared with 1938
RAILWAY OPERATING REVENUES	\$504,913	+\$59,232
TOTAL OPERATING EXPENSES	400,424	-10,515
NET REVENUE FROM OPERATIONS	104,489	+69,747
Taxes	37,085	-11,037
Railway operating income	67,404	+80,784
Net rents—Dr.	5,202	-3,399
NET RAILWAY OPERATING INCOME	62,202	+77,385
Other income	32,473	+2,735
TOTAL INCOME	94,675	+80,120
Rent for leased roads	6,774	-69
Interest on funded debt	137,820	.....
TOTAL FIXED CHARGES	155,799	-2,020
NET DEFICIT	\$85,066	-\$80,660

FORT DODGE, DES MOINES & SOUTHERN.—*Reorganization.*—Division 4 of the Interstate Commerce Commission has certified that in the preparation of a report on the income accounts of this company during reorganization proceedings under section 77 of the Bankruptcy Act its Bureau of Accounts has incurred costs for salaries, for transportation, and for mimeographic copies, the sum of \$2,499.

MINNEAPOLIS, ST. PAUL & SAULTE STE. MARIE-WISCONSIN CENTRAL.—*Joint Operation.*—These companies have been authorized by Division 4 of the Interstate Commerce Commission to operate their freight trains over the main line of the Chicago, Milwaukee, St. Paul & Pacific between Rugby Junction, Wisc., and Milwaukee, 25.5 miles, and to use certain

freight terminals of the Milwaukee in Milwaukee.

LEHIGH & NEW ENGLAND.—*Annual Report.*—The 1939 annual report of this road shows net income, after interest and other charges, of \$861,727, an increase of \$523,928 as compared with net income in 1938. Selected items from the income statement follow:

	1939	Increase or Decrease Compared with 1938
RAILWAY OPERATING REVENUES	\$4,286,652	+\$893,908
Maintenance of way	456,158	+95,759
Maintenance of equipment	717,483	+2,948
Transportation	1,328,051	+101,826
TOTAL OPERATING EXPENSES	2,766,017	+219,800
Operating ratio	64.52	-10.53
NET REVENUE FROM OPERATIONS	1,520,634	+674,107
Railway tax accruals	351,538	+130,577
Railway operating income	1,169,095	+543,530
Net rents—Cr.	66,228	-14,187
NET RAILWAY OPERATING INCOME	1,235,324	+529,342
Other income	22,646	-1,546
TOTAL INCOME	1,257,971	+527,796
Interest on funded debt	366,228	-3,348
TOTAL FIXED CHARGES	370,923	-3,423
NET INCOME	\$861,727	+\$523,928

NEW YORK CENTRAL.—*Preliminary Report.*—The preliminary report of this company for the year 1939 shows a net income of \$4,509,236 after interest and other charges, as compared with a net deficit of \$20,154,357 in 1938. Selected items from the income account follow:

	1939	Increase or Decrease Compared with 1938
RAILWAY OPERATING REVENUES	\$341,086,708	+\$42,405,513
Maintenance of way	36,401,031	+3,346,726
Maintenance of equipment	70,409,084	+10,933,224
Transportation	128,370,420	+5,104,599
TOTAL OPERATING EXPENSES	256,884,232	+19,381,849
Operating ratio	75.31	-421
NET REVENUE FROM OPERATIONS	84,202,476	+23,023,664
Railway tax accruals	31,735,690	-987,915
Net Debits for Equipment, and Joint facility rents	15,163,359	+2,290,628
NET RAILWAY OPERATING INCOME	37,303,427	+21,720,951
Other income	16,893,421	+1,719,755
TOTAL INCOME	54,196,848	+23,440,706
Rent for leased roads	22,059,323	-412,872
Interest on funded debt	25,005,580	-291,923
TOTAL FIXED CHARGES	48,103,444	-1,127,320
NET INCOME	\$4,509,236	+\$24,663,593

NEW YORK, NEW HAVEN & HARTFORD.—*Equipment Trust Certificates.*—This company has been authorized by Division 4 of the Interstate Commerce Commission to assume liability for \$960,000 of 2½ per cent equipment trust certificates, maturing in 10 equal annual installments of \$96,000 on February 1, in each of the years from 1941 to 1950, inclusive. The issue has been

sold at 103.151 to McMaster Hutchinson & Co., on behalf of itself and Putnam & Co., and W. H. Newbold's Son & Co., making the average annual cost to the company approximately 1.87 per cent.

NEW YORK CENTRAL.—*Abandonment by Michigan Central.*—Due to the fact that the Michigan Central has agreed to operate its Caro branch between Caro, Mich., and Owendale for a test period, Division 4 of the Interstate Commerce Commission has dismissed, without prejudice, its application for authority to abandon the line.

NEW YORK, NEW HAVEN & HARTFORD.—*Abandonment.*—This company has asked the Interstate Commerce Commission for authority to abandon a line extending from Hobarts, Conn., to Brookfield Junction, 2.2 miles.

NEW YORK, SUSQUEHANNA & WESTERN.—*Abandonment.*—Federal Judge William Clark has set April 8 for a hearing on the application of Walter Kidde, trustee of this road, to discontinue service on 11.79 miles of line between Hainesburg junction, N. J., and Stroudsburg, Pa. (Shops). The road estimates an annual loss of \$90,000 incurred in operating this section.

SOUTHERN PACIFIC.—*Stock.*—This company has asked the Interstate Commerce Commission for authority to issue 3,772,763.0564 shares of its capital stock without par value. The petition states that the authorized capital stock of the company now consists of 5,944,518 common shares, each with a par value of \$100 with an aggregate value of \$594,451,800, of which 3,772,763.0564 shares are issued and outstanding. It is proposed to change the 5,944,518 authorized shares into the same number of common shares without nominal par value and to substitute 3,772,763.0564 of such shares without par value, share for share, for the 3,772,763.0564 issued shares of the par value of \$100 each. The commission is also informed that the company does not intend to issue the authorized but unissued stock at this time.

SPOKANE INTERNATIONAL.—*Reorganization Plan.*—A reorganization plan whereby holders of \$4,200,000 of bonds will take over this road, has been approved by the federal district court and will be submitted to the Interstate Commerce Commission.

WESTERN PACIFIC.—*Abandonment.*—This company has asked the Interstate Commerce Commission for authority to abandon its Calpine branch extending from Calpine Junction, Calif., to Calpine, 12.6 miles, and its Gulling branch, extending from Gulling Junction, Calif., to Gulling, 1.4 miles.

Dividends Declared

Joliet & Chicago. — \$1.75, quarterly, payable April 1 to holders of record March 15.
Lackawanna R. R. of N. J.—\$1.00, quarterly, payable April 1 to holders of record March 15.
Southern—Mobile & Ohio.—\$2.00, semi-annually, payable April 1 to holders of record March 16.

Average Prices of Stocks and Bonds

	Mar. 12	Last week	Last year
Average price of 20 representative railway stocks..	31.53	31.50	33.28
Average price of 20 representative railway bonds..	59.19	58.87	64.02

Railway Officers

EXECUTIVE

C. V. Berglund, assistant to the general manager of the Northern Pacific, with headquarters at Seattle, Wash., has been appointed assistant to the vice-president operation and maintenance, a newly created position, with headquarters at St. Paul, Minn.

J. H. Shaw, general freight and passenger agent of the Arkansas & Louisiana Missouri, has been appointed vice-president and traffic manager, with headquarters as before at Shreveport, La., succeeding **P. M. Atkins**, deceased. The position of general freight and passenger agent has been abolished.

FINANCIAL, LEGAL AND ACCOUNTING

T. N. Flinn, claim agent of the Missouri & Arkansas, has been appointed general claims and industrial agent, with headquarters as before at Harrison, Ark., a change in title.

John S. Marshall, assistant attorney on the Chesapeake & Ohio and the New York, Chicago & St. Louis (Nickel Plate) at Cleveland, Ohio, has been promoted to attorney, with the same headquarters.

Earl L. Keller, whose appointment as treasurer of the New York, Susquehanna & Western, with headquarters at New York was announced in the *Railway Age* of March 2, was born on August 16, 1894, at Chicago. Mr. Keller entered railroad



Conway Studios

Earl L. Keller

service in 1913 with the Erie, where he served in various capacities until 1917. He was a member of the U. S. Army from 1917 until 1919, at which time he became chief clerk in the Hornell accounting bureau. In 1920 he was appointed division accountant, with headquarters at Marion, Ohio, and in 1921 he became traveling auditor, serving until 1925. From 1925 to 1927 Mr. Keller was employed as resident accountant with headquarters at Carbon-

dale, Pa., and from 1927 to 1937 he was chief statistician and special representative to general manager, with headquarters at Hornell and New York. In 1937 he became office manager to the trustee of the New York, Susquehanna & Western, which position he held until his recent appointment as treasurer of that road.

OPERATING

Walter E. Davis, assistant chief dispatcher on the Illinois Central at Paducah, Ky., has been promoted to trainmaster at Louisville, Ky., succeeding **Charles O. Cecil**, deceased.

T. H. DeLano has been appointed trainmaster of the McCloud River Railroad, with headquarters at McCloud, Cal., succeeding **P. W. Herron**, whose promotion to assistant superintendent was announced in the *Railway Age* of February 10.

R. C. McIntyre, superintendent motive power of the Union Railroad, with headquarters at East Pittsburgh, Pa., has been appointed acting general manager, with the same headquarters, succeeding **W. S. McAbee**, vice-president and general manager, whose death on February 9 was announced in the *Railway Age* of February 17.

A. A. Freiburger, who has been on a leave of absence because of illness for some time, has been appointed trainmaster of the Illinois division of the Chicago Great Western, with headquarters at Oelwein, Iowa, succeeding **W. L. Smith**, who has been transferred to Chicago. Mr. Smith relieves **W. R. McCollom**, who has been granted a leave of absence because of illness.

R. W. McSpadden, chief dispatcher on the Union Pacific at Gering, Neb., has been promoted to trainmaster at that point. **G. J. Mulick**, assistant superintendent at Green River, Wyo., has been transferred to Omaha, Neb., a newly created position, and **B. F. Wells**, trainmaster at Ogden, Utah, has been promoted to assistant superintendent at Green River, replacing Mr. Mulick. **W. C. Scatterfield** has been appointed trainmaster at Ogden relieving Mr. Wells.

James Clark, assistant superintendent on the Canadian National at Edmonton, Alta., has been promoted to superintendent, with headquarters at Prince Rupert, B. C., succeeding **W. H. Tobey**, whose appointment as general manager of the Pacific Great Eastern was announced in the *Railway Age* of February 17, and **W. E. Rivers**, assistant superintendent at Prince Albert, has been transferred to Edmonton replacing Mr. Clark. **D. C. Gough**, transportation assistant of the Vancouver Island Lines at Victoria, B. C., has been promoted to assistant superintendent at Prince Albert relieving Mr. Rivers.

Charles Francis Duggan, whose promotion to superintendent on the Illinois Central, with headquarters at Waterloo, Iowa, was announced in the *Railway Age* of February 17, was born at Ryan, Iowa, on August 15, 1895, and attended the Cedar

Rapids Business College in 1915. He entered railway service on March 8, 1916, as a stenographer in the division accountant's office of the Illinois Central at Dubuque, Iowa, and on October 1, 1918, he was promoted to chief accountant on the Illinois



Charles Francis Duggan

division at Champaign, Ill. On February 15, 1920, he was advanced to chief clerk to the superintendent at Champaign, and on September 1, 1920, he was promoted to chief clerk to the general superintendent, Northern lines, at Chicago. Mr. Duggan was advanced to trainmaster at Carbondale, Ill., on March 1, 1929, and later served in that capacity, with the exception of several months in 1936, when he was assigned special work for the vice-president and general manager, at Clinton, Ill., Chicago and Champaign. He was located at the latter point at the time of his promotion, which was effective February 16.

TRAFFIC

W. A. Kraus has been appointed general agent on the New York Central at Kankakee, Ill., a newly created position.

C. J. Buckham has been appointed general agent for the Ann Arbor at Seattle, Wash., succeeding **G. R. Reynolds**.

T. P. Ramsey has been appointed assistant general freight and passenger agent of the Mississippi Central, with headquarters at Hattiesburg, Miss., succeeding **W. J. Kessler**.

Joseph R. Dehner, commercial agent for the Atlanta & West Point, the Western Railway of Alabama and the Georgia railroad at Chicago, has been promoted to general western agent at that point succeeding **A. S. Davis**.

C. G. Sheffield, assistant general baggage agent on the Southern Pacific, with headquarters at San Francisco, Cal., has been appointed general baggage agent, with the same headquarters, succeeding **T. A. K. Fassett**, who has retired.

J. R. Van Delinder, general freight agent on the Chicago, Indianapolis & Louisville (Monon), with headquarters at Chicago, has returned to his duties, having been on a leave of absence because of illness, and **J. L. Fortier**, acting general

Streamlined trains pay off **IN HIGH NET REVENUES**



The "Daylights", the high-speed, luxury streamliners of the Southern Pacific, returned to the railroad a net revenue of 69.3% in the year ending June 30, 1938; and a net revenue of 72.9% for the year ending June 30, 1939.

These Lima-Built steam locomotives have proved the money-making ability of Modern, streamlined passenger power. Modernize your road with Lima streamlined locomotives and enjoy this untapped source of revenue.

LIMA LOCOMOTIVE WORKS,



INCORPORATED, LIMA, OHIO

freight agent at Chicago, has been appointed chief of the tariff bureau with the same headquarters.

Harold M. Smith, passenger representative of the New York Central with headquarters at Boston, Mass., has been appointed district passenger agent, with headquarters at the Union Station, Worcester, Mass.

ENGINEERING AND SIGNALING

J. J. Clutz, supervisor of track on the New York division of the Pennsylvania, with headquarters at Trenton, N. J., has been promoted to division engineer of the Indianapolis division, with headquarters at Indianapolis, Ind., succeeding **E. O. Wood**.

MECHANICAL

Bert H. Smith, whose promotion to superintendent of motive power of the Second district of the Chicago, Rock Island & Pacific, with headquarters at Kansas City, Mo., was announced in the *Railway Age* of February 24, entered railway service on September 1, 1894, as a machinist apprentice on the Northern Pacific at Brainerd, Minn., later serving as a machinist on various roads from January, 1900 to May, 1903. On the latter date he was promoted to roundhouse foreman on the Atchison, Topeka & Santa Fe at Chicago, and in May, 1904, he was appointed division foreman at Marceline, Mo., later being

transferred to Emporia, Kan. In January, 1907, he left railroad service to become a representative of a railroad supply company and in October, 1908, he became general foreman on the Chicago, Rock Island and Pacific at Caldwell, Kan. Mr. Smith went with the Kansas City, Mexico & Orient (now part of the Santa Fe system), in March, 1911, as general foreman at Emporia, Kan., and in October, 1914, he returned to the Rock Island as general foreman at Fairbury, Neb. In October, 1918, he was promoted to master mechanic at that point, later serving in that capacity at various points, including Estherville, Iowa, Horton, Kan., Little Rock, Ark., and Des Moines, Iowa, being located at the latter point at the time of his recent promotion.

SPECIAL

C. H. Shaw, shop foreman for the Burlington Transportation Company (bus subsidiary of the Chicago, Burlington & Quincy), at Lincoln, Neb., has been promoted to division superintendent, with headquarters at Cheyenne, Wyo., succeeding **Walter Brady**, who has been appointed shop foreman at Omaha, Neb.

OBITUARY

Richard W. Sheffer, superintendent of freight transportation of the Pennsylvania, died March 9 in the Pennsylvania hospital at the age of 37. He was born at York,

Pa., on August 9, 1902, and was graduated from Bucknell University with the degree of Bachelor of Science, Civil Engineering, in 1923. On August 1, 1923, he entered the service of the Pennsylvania as a rodman, and on November 17, 1926, he was appointed assistant supervisor of the Delaware division, serving later in the same capacity on the New York division, the Middle division and the Philadelphia Terminal division. On November 10, 1928, Mr. Sheffer was appointed supervisor of the Sunbury division and was transferred in the same capacity to the Atlantic division in 1929, to the Philadelphia Terminal division in 1930, and to the Panhandle division in July, 1933. He became division engineer in the chief engineer's department at Philadelphia on October 5, 1934, and on June 1, 1935, was transferred to the department of the vice-president in charge of traffic as division engineer, special duty. On November 19, 1935, Mr. Sheffer was transferred to the Middle division as division engineer and on August 9, 1937, was transferred in the same capacity to the Pittsburgh division, which position he relinquished on April 1, 1939, to become superintendent of the Wilkes-Barre division. On January 16, 1940, Mr. Sheffer became superintendent of freight transportation, the position he held until his death.

Walter J. Donally, division superintendent of the Canadian National, with headquarters at Prince Albert, Sask., died March 2, at a hospital in Winnipeg, Man., at the age of 56.

Operating Revenues and Operating Expenses of Class I Steam Railways

Compiled from 133 Monthly Reports of Revenues and Expenses Representing 137 Class I Steam Railways

(Switching and Terminal Companies Not Included)

FOR THE MONTH OF JANUARY, 1940 AND 1939

Item	United States		Eastern District		Southern District		Western District	
	1940	1939	1940	1939	1940	1939	1940	1939
Miles of road operated at close of month	233,091	233,819	57,415	57,643	44,385	44,515	131,291	131,661
Revenues:								
Freight	\$283,107,274	\$246,812,584	\$125,941,866	\$104,928,684	\$59,620,513	\$52,667,739	\$97,544,895	\$89,216,161
Passenger	36,079,204	34,785,495	19,589,944	19,454,919	6,147,725	5,328,517	10,341,535	10,002,059
Mail	8,085,564	7,925,906	3,040,044	2,989,706	1,434,247	1,426,505	3,611,273	3,509,695
Express	3,577,228	3,357,044	1,459,757	1,215,279	799,402	881,209	1,318,069	1,260,556
All other operating revenues	14,648,949	12,897,738	7,419,422	6,495,594	1,962,500	1,735,182	5,267,027	4,666,962
Railway operating revenues	345,498,219	305,778,767	157,451,033	135,084,182	69,964,387	62,039,152	118,082,799	108,655,433
Expenses:								
Maintenance of way and structures	33,933,480	31,375,988	13,902,875	12,537,923	7,126,501	6,627,501	12,904,104	12,210,564
Maintenance of equipment	68,970,399	62,105,960	32,088,792	27,251,115	13,476,957	12,094,880	23,404,650	22,759,965
Traffic	8,823,765	8,514,221	3,141,024	2,976,136	1,823,151	1,735,310	3,859,590	3,802,775
Transportation—Rail line	130,819,242	116,728,400	60,824,842	52,827,897	23,007,995	20,336,233	46,986,405	43,564,270
Transportation—Water line	519,044	373,347	.....	.....	.....	.....	519,044	373,347
Miscellaneous operations	3,453,092	3,179,066	1,538,692	1,441,541	600,412	489,271	1,313,988	1,248,254
General	11,041,921	10,838,662	4,362,134	4,338,891	2,138,466	2,049,675	4,541,321	4,450,096
Transportation for investment—Cr.	219,936	169,195	50,893	16,966	47,592	35,766	121,451	116,463
Railway operating expenses	257,341,007	232,946,449	115,807,466	101,356,537	48,125,890	43,297,104	93,407,651	88,292,808
Net revenue from railway operations	88,157,212	72,832,318	41,643,567	33,727,645	21,838,497	18,742,048	24,675,148	20,362,625
Railway tax accruals	31,550,700	29,039,948	13,476,472	11,933,132	7,222,906	6,367,991	10,851,322	10,738,825
Railway operating income	56,606,512	43,792,370	28,167,095	21,794,513	14,615,591	12,374,057	13,823,826	9,623,800
Equipment rents—Dr. balance	8,377,587	7,908,592	4,208,313	3,694,371	511,761	515,622	3,657,513	3,698,599
Joint facility rent—Dr. balance	2,662,292	2,936,606	1,627,384	1,609,731	85,246	333,273	949,662	993,602
Net railway operating income	45,566,633	32,947,172	22,331,398	16,490,411	14,018,584	11,525,162	9,216,651	4,931,599
Ratio of expenses to revenues (per cent)	74.5	76.2	73.6	75.0	68.8	69.8	79.1	81.3
Depreciation included in operating expenses	16,865,256	16,804,309	7,312,483	7,312,962	3,403,885	3,326,499	6,148,888	6,164,848
Pay roll taxes	9,632,729	8,462,932	4,330,431	3,691,228	1,766,929	1,529,438	3,535,369	3,242,266
All other taxes	21,917,971	20,577,016	9,146,041	8,241,904	5,455,977	4,838,553	7,315,953	7,496,559

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

Table of Revenues and Expenses begins on next left-hand page

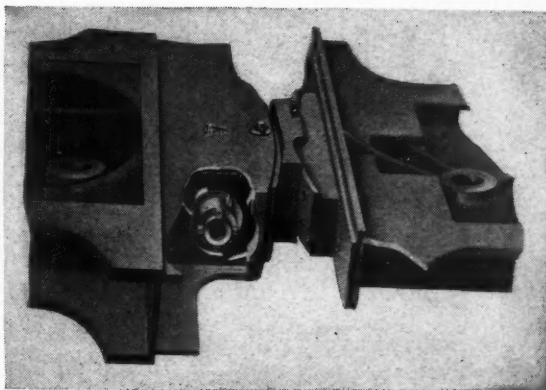
97.7%

of the steam locomotives purchased in 1939

HAVE

FRANKLIN E-2 RADIAL BUFFERS

97.7% of the steam locomotives purchased during 1939 for use in the United States are assured of easier riding and greater safety. Slack between engine and tender is eliminated by the application of the Franklin E-2 Radial Buffer, thus absolutely removing one of the principal causes of hard riding. » » » The Franklin E-2 Radial Buffer quickly pays for itself . . . in economy . . . in safety . . . in increased passenger comfort . . . and in lower maintenance.



FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK

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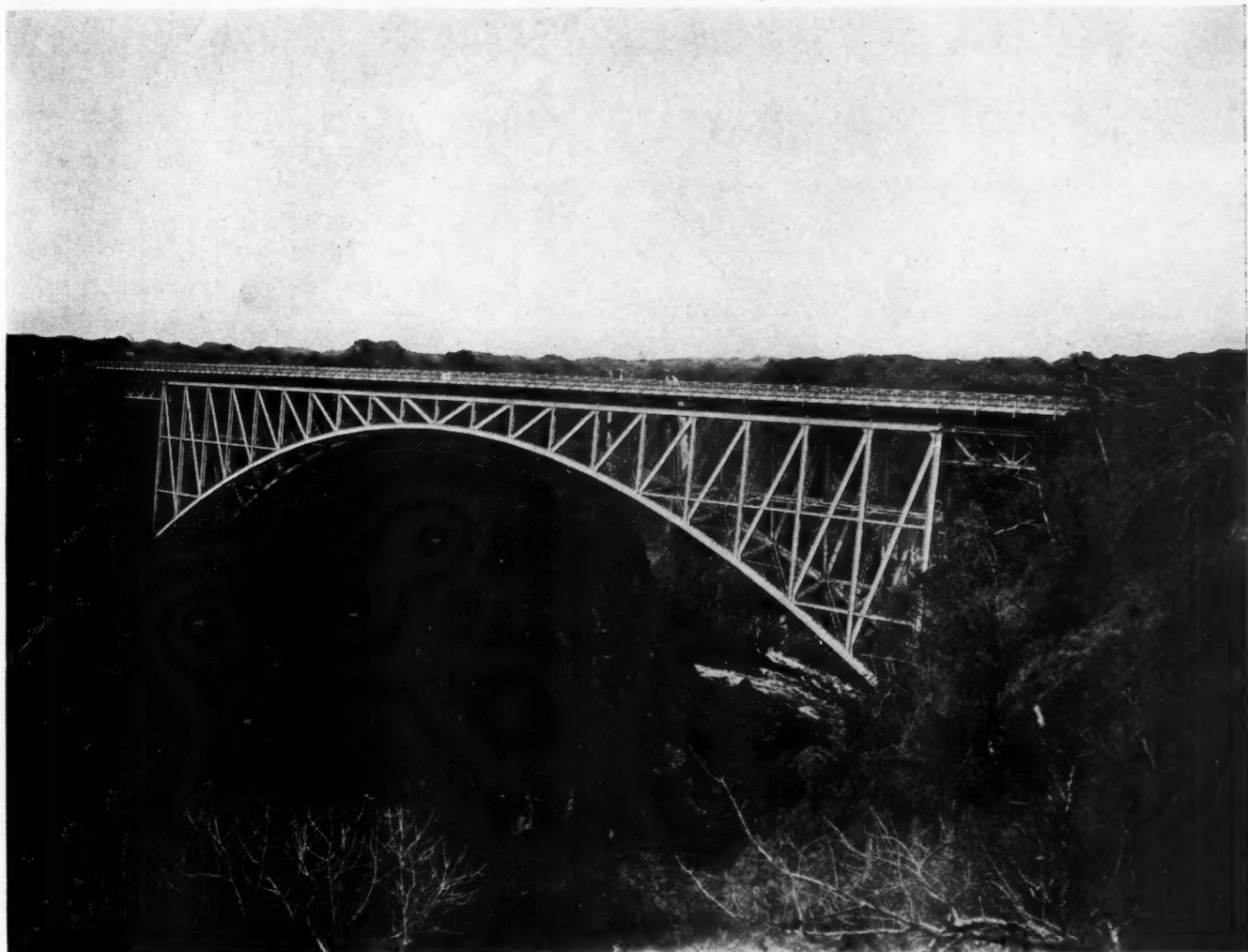
MONTREAL

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF JANUARY OF CALENDAR YEAR 1940

Name of road	Av. mileage operated during period	Operating revenues			Operating expenses			Operating ratio	Net from railway operation	Net railway operating income				
		Freight	Passenger (inc. misc.)	Total	Maintenance of way and structures		Traffic			Trans- portation	Total	Operating income	1940	1939
Akron, Canton & Youngstown.....	171	\$197,283	\$39	\$205,820	\$22,222	\$22,031	\$13,464	\$59,272	\$126,668	61.5	\$79,152	\$47,319	\$39,600	
Alton.....	959	866,897	221,809	1,282,960	124,474	280,389	42,285	589,218	1,109,306	96.5	773,634	97,189	50,299	
Atchison, Topeka & Santa Fe System.....	13,421	9,414,168	1,470,616	11,967,662	1,630,848	2,906,820	446,522	4,795,436	10,180,152	85.1	1,787,510	540,062	143,218	
Atlanta & West Point.....	93	110,245	25,430	156,715	21,311	25,174	8,105	66,911	132,206	84.4	24,509	—2,241	—2,742	
Western of Alabama.....	133	100,321	24,895	142,042	21,928	29,956	8,123	57,946	127,696	89.9	14,346	2,366	6,036	
Atlanta, Birmingham & Coast.....	639	241,632	43,713	305,077	53,079	52,078	23,965	129,398	273,858	89.8	31,219	—16,785	22,549	
Atlantic Coast Line.....	5,104	3,288,209	967,096	4,731,906	465,695	832,974	177,797	1,899,978	3,624,490	76.6	1,107,416	376,765	337,274	
Charleston & Western Carolina.....	343	228,223	1,204	233,249	25,379	47,497	8,159	77,016	163,755	70.2	69,494	39,456	34,385	
Baltimore & Ohio.....	6,382	12,810,074	850,038	14,474,441	1,232,157	3,701,077	360,594	5,458,960	11,344,048	78.4	3,130,393	2,152,884	1,670,919	
Staten Island Rapid Transit.....	24	58,495	63,734	132,567	8,832	23,132	939	81,880	125,992	95.0	6,575	—22,852	—33,165	
Bangor & Aroostook.....	603	523,006	15,491	556,707	89,340	85,985	5,497	144,761	351,413	63.1	205,294	150,594	167,564	
Bessemer & Lake Erie.....	224	595,918	681	611,565	61,702	293,942	11,977	168,821	568,776	93.0	42,789	57,719	—57,751	
Roston & Maine.....	1,910	3,013,248	588,370	4,079,408	478,737	620,392	62,707	1,658,746	2,985,456	73.2	1,093,952	791,983	548,191	
Burlington, Rock Island.....	255	83,054	18,265	110,060	16,086	18,830	4,890	54,926	105,107	95.5	4,953	—5,198	—3,558	
Cambria & Indiana.....	37	152,894	.....	153,019	5,565	37,736	418	15,706	66,072	43.17	86,947	121,111	116,026
Canadian Pacific Lines in Maine.....	234	361,230	13,761	389,353	23,528	52,296	8,248	113,274	202,846	35.9	186,507	174,872	42,990	
Canadian Pacific Lines in Vermont.....	91	89,028	12,064	111,068	10,857	28,835	2,981	71,019	116,592	105.0	—5,324	—32,909	—53,727	
Central of Georgia.....	1,871	1,054,847	124,421	1,333,434	176,712	273,937	57,504	607,744	1,193,842	89.5	139,592	5,189	39,976	
Central of New Jersey.....	710	2,737,972	338,005	3,271,679	204,839	596,273	44,197	1,326,079	2,255,952	69.0	1,015,727	607,685	390,679	
Central Vermont.....	422	435,555	40,384	513,649	50,624	102,911	11,060	239,713	422,987	82.3	90,662	63,372	32,385	
Chesapeake & Ohio.....	3,117	10,959,993	266,053	10,760,750	970,302	2,104,637	214,783	2,687,383	6,319,839	58.7	4,440,911	3,073,771	3,465,628	
Chicago & Eastern Illinois.....	925	1,060,372	166,364	1,379,343	143,805	248,089	56,952	572,067	1,089,440	79.0	289,903	210,903	43,184	
Chicago & Illinois Midland.....	131	377,418	674	385,920	44,689	70,614	24,958	109,239	268,772	69.6	117,148	82,623	79,457	
Chicago & North Western.....	8,327	5,167,393	908,740	6,876,991	816,177	1,515,326	185,088	3,162,065	6,008,450	87.4	868,541	244,426	—214,747	
Chicago, Burlington & Quincy.....	9,004	6,392,140	734,251	7,940,191	717,339	1,683,792	239,387	3,194,676	6,122,086	77.1	1,818,105	751,666	752,484	
Chicago Great Western.....	1,502	1,387,920	40,744	1,535,379	203,009	254,068	60,703	612,547	1,181,005	76.9	354,374	70,272	33,840	
Chicago, Indianapolis & Louisville.....	549	711,137	49,399	829,640	63,012	150,585	28,764	320,104	600,185	72.3	229,455	186,499	—89,973	
Chicago, Milwaukee, St. Paul & Pacific.....	10,890	7,676,490	667,702	9,167,752	887,047	1,696,728	214,110	3,625,693	6,812,205	74.3	2,355,547	1,642,547	437,013	
Chicago, Rock Island & Pacific.....	7,858	4,982,753	736,162	6,310,443	666,231	1,235,884	255,680	2,670,988	5,186,248	82.2	1,124,195	305,819	268,348	
Chicago, St. Paul, Minneapolis & Omaha.....	1,629	1,259,107	133,796	1,481,897	100,291	260,964	39,461	734,098	1,205,463	81.4	276,434	44,492	—95,454	
Clinchfield Railroad.....	308	771,616	3,622	780,794	29,304	117,379	18,662	146,353	327,798	42.0	452,996	378,935	313,054	
Colorado & Southern.....	787	476,241	31,568	561,410	48,219	84,758	14,406	238,907	413,919	45.7	147,491	69,737	—59,546	
Fort Worth & Denver City.....	902	406,661	50,653	450,934	44,858	90,771	19,713	171,378	359,822	79.8	91,112	23,214	9,745	
Columbus & Greenville.....	168	74,793	5,032	86,005	16,979	13,068	4,414	36,815	82,068	95.4	3,937	—2,631	6,129	
Delaware & Hudson.....	846	2,237,847	101,027	2,451,700	284,237	429,068	42,963	843,059	1,688,211	68.9	763,489	528,908	528,908	
Delaware, Lackawanna & Western.....	995	3,850,577	549,077	4,829,542	267,828	885,657	109,052	2,174,560	3,591,981	74.4	1,237,561	707,006	491,526	
Denver & Rio Grande Western.....	2,554	1,887,797	118,943	2,106,619	140,928	522,579	69,622	785,804	1,603,218	76.1	503,401	244,967	145,021	
Denver & Salt Lake.....	232	303,493	6,962	320,467	14,813	43,554	2,837	88,588	160,308	50.0	160,159	172,303	82,284	
Detroit & Mackinac.....	242	42,230	3,918	52,421	8,241	11,554	880	25,509	49,453	94.3	2,968	—3,262	637	
Detroit & Toledo Shore Line.....	50	404,142	.....	405,925	18,241	25,551	8,793	97,900	157,997	38.9	247,928	128,263	95,147
Detroit, Toledo & Ironton.....	472	841,151	189	862,948	68,237	81,487	11,989	175,213	357,564	41.4	505,384	361,548	297,342	
Duluth, Missabe & Iron Range.....	541	106,636	806	120,924	107,924	210,540	4,515	158,586	513,428	394.0	—383,122	—539,724	—560,001	
Duluth, Winnipeg & Pacific.....	175	118,029	992	121,936	16,601	22,290	2,069	50,253	94,384	77.4	27,552	17,839	—158	
Elgin, Joliet & Eastern.....	390	1,712,354	8	1,982,666	131,467	320,475	15,627	760,341	1,261,955	63.6	720,711	531,427	5,960	
Erie.....	2,268	6,299,911	397,665	7,117,055	477,203	1,430,999	174,995	2,794,315	5,143,261	72.3	1,973,794	1,394,975	1,080,317	

Continued on next left-hand page



VICTORIA FALLS BRIDGE

AFRICA

This 35 year old bridge is one of the most famous arches in the world. Originally designed to carry a double track of the Rhodesia Railways over the gorge of the River Zambesi at Victoria Falls, it has been altered to carry a single track, a 15 ft. highway, and a 9 ft. footway for pedestrians. It consists of a main span of 500 ft., and two end spans of $87\frac{1}{2}$ ft. and $62\frac{1}{2}$ ft. respectively and carries the track at a height of 411 ft. above low water level.

* * * * *

The Security Sectional Arch has carved an equally important niche for itself in the annals of American Railroad history. 31 years ago the Arch was introduced to the railroads, since then American Arch Company Engineers have constantly developed it to keep pace with modern railroading, until today it is standard on American Railroads. But the Security Sectional Arch's true economies can be realized only when your Arch is *complete*.

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60 EAST 42nd STREET, NEW YORK, N. Y.

***Locomotive Combustion
Specialists***

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JANUARY OF CALENDAR YEAR 1940—CONTINUED

Name of road	Av. mileage operated during period	Operating revenues			Operating expenses			Operating ratio	Net from railway operation	Net railway operating income		
		Freight	Passenger (inc. misc.)	Total	Maintenance of way and structures	Equip-ment	Traffic			Total	1940	1939
Florida East Coast.....Jan.	685	\$640,273	\$436,597	\$1,209,241	\$97,625	\$186,122	\$31,265	\$416,273	\$827,313	\$307,911	\$258,403	\$259,079
Georgia Railroad.....Jan.	329	263,600	11,996	297,703	32,147	50,699	18,002	142,037	256,327	26,405	32,197	38,532
Georgia & Florida.....Jan.	408	83,261	1,106	87,680	22,832	16,730	8,612	39,274	92,890	-13,507	-17,623	-12,094
Grand Trunk Western.....Jan.	1,029	1,900,588	80,739	2,124,647	241,023	405,709	38,929	870,438	1,620,357	376,515	286,118	96,923
Canadian National Lines in New England.....Jan.	172	129,705	4,503	148,271	38,185	22,502	2,578	79,721	153,018	-20,841	-61,749	-66,446
Great Northern.....Jan.	8,070	4,783,106	334,392	5,590,835	592,318	1,276,830	178,160	2,278,297	4,573,639	320,277	229,426	-99,283
Green Bay & Western.....Jan.	234	143,044	351	148,683	22,358	17,691	7,384	52,986	105,228	29,100	23,849	31,111
Gulf & Ship Island.....Jan.	259	72,165	5,175	86,325	19,441	16,793	2,761	56,408	100,315	-30,612	-38,375	-33,274
Gulf, Mobile & Northern.....Jan.	827	526,859	14,447	566,593	71,606	86,639	43,107	161,332	402,024	114,569	77,786	66,450
Illinois Central.....Jan.	4,949	7,229,427	878,314	8,682,224	782,441	1,725,800	223,688	3,532,525	6,612,456	1,320,410	1,219,068	1,061,297
Yazoo & Mississippi Valley.....Jan.	1,619	1,055,106	55,539	1,185,094	113,541	170,855	34,803	533,811	901,140	142,560	63,629	38,306
Illinois Central System.....Jan.	6,568	8,284,533	933,853	9,867,318	895,982	1,896,655	258,491	4,066,336	7,513,596	2,353,722	1,290,610	1,108,516
Illinois Terminal.....Jan.	481	423,205	62,940	525,708	49,258	71,396	17,787	189,545	345,698	132,428	103,137	57,499
Kansas City Southern.....Jan.	879	1,062,572	25,999	1,202,228	101,005	169,015	56,488	377,453	759,783	345,445	289,739	267,275
Kansas, Oklahoma & Gulf.....Jan.	328	202,772	366	206,242	9,751	9,269	8,852	43,140	81,646	104,222	88,409	100,289
Lake Superior & Ishpeming.....Jan.	156	27,714	53	29,560	17,039	30,222	563	21,293	75,251	-68,101	-66,888	-78,966
Lehigh & Hudson River.....Jan.	96	132,143	.....	133,020	8,993	25,194	3,519	48,079	92,610	25,621	14,788	21,348
Lehigh & New England.....Jan.	190	368,755	.....	370,168	25,160	63,877	7,094	118,365	230,284	104,485	105,772	68,918
Lehigh Valley.....Jan.	1,282	3,928,254	157,552	4,339,617	214,084	699,600	108,385	1,818,878	2,965,730	1,062,940	787,998	635,618
Louisiana & Arkansas.....Jan.	847	654,172	7,186	686,483	81,931	107,115	30,039	197,322	440,066	187,341	139,592	97,643
Louisville & Nashville.....Jan.	4,871	7,540,970	579,733	8,653,490	825,875	2,135,720	187,066	3,003,036	6,440,221	2,213,269	1,432,260	1,374,036
Maine Central.....Jan.	991	982,690	67,306	1,114,029	135,222	208,329	11,106	417,007	806,336	259,093	208,748	178,894
Midland Valley.....Jan.	352	140,929	5	143,162	5,866	7,102	2,645	38,190	59,823	71,963	60,348	34,067
Minneapolis & St. Louis.....Jan.	1,512	679,338	5,546	716,566	66,429	126,014	54,306	294,606	581,005	87,580	46,095	34,347
Minneapolis, St. Paul & Sault Ste. Marie.....Jan.	4,285	1,865,481	63,181	2,074,970	256,573	391,130	64,671	1,000,607	1,795,489	103,655	15,346	-215,726
Duluth, South Shore & Atlantic.....Jan.	550	132,005	7,709	151,115	30,948	31,763	6,265	80,400	155,782	-18,749	-20,823	-22,594
Spokane International.....Jan.	152	49,937	713	58,393	7,360	6,724	2,298	21,241	41,997	16,342	7,850	13,890
Mississippi Central.....Jan.	150	61,888	2,797	67,184	10,006	9,509	6,793	21,496	52,765	9,945	5,718	-2,692
Missouri & Arkansas.....Jan.	364	78,805	1,308	93,510	18,777	10,159	6,818	31,446	72,146	17,061	8,496	3,277
Missouri-Illinois.....Jan.	193	180,761	319	182,877	14,218	22,102	2,565	51,747	95,963	70,504	59,234	43,594
Missouri-Kansas-Texas Lines.....Jan.	3,294	1,788,457	187,306	2,191,038	258,135	354,790	108,940	938,057	1,795,176	254,260	75,066	8,077
Missouri Pacific.....Jan.	7,146	6,289,765	432,408	7,357,576	754,511	1,353,498	243,875	2,951,171	5,573,362	1,270,409	914,628	592,204
Gulf Coast Lines.....Jan.	1,759	1,396,398	35,704	1,495,523	194,163	185,255	46,636	432,373	908,921	507,665	382,071	388,423
International Great Northern.....Jan.	1,155	742,719	78,783	932,457	156,542	190,475	29,853	409,650	839,688	28,249	-39,692	-58,419
Mobile & Ohio.....Jan.	1,180	825,842	23,427	869,736	149,877	196,060	44,757	356,731	794,883	104,853	-27,135	-206
Monongahela.....Jan.	172	463,250	513	467,511	37,615	40,712	545	109,272	190,722	239,319	155,048	84,738
Montour.....Jan.	51	164,927	.....	167,088	7,926	38,100	1,003	49,402	103,103	38,469	64,353	45,727
Nashville, Chattanooga & St. Louis.....Jan.	1,111	980,691	131,258	1,262,088	102,973	240,596	72,235	514,054	981,697	201,208	170,473	235,291
Nevada Northern.....Jan.	165	55,601	625	60,255	7,908	3,184	1,252	10,226	27,829	21,902	23,788	23,186
New York Central.....Jan.	11,008	23,189,617	5,354,364	31,736,578	2,815,516	6,254,403	544,294	12,486,381	23,450,405	5,162,107	3,796,096	2,147,005
Pittsburgh & Lake Erie.....Jan.	233	1,780,858	47,246	1,885,026	127,429	728,965	30,260	598,322	1,565,930	1,28,247	350,075	175,330
New York, Chicago & St. Louis.....Jan.	1,704	3,877,041	66,749	4,056,059	362,500	614,593	124,527	1,471,114	2,693,200	1,139,123	794,914	538,757
New York, New Haven & Hartford.....Jan.	1,867	4,202,254	2,134,282	7,034,177	664,417	1,179,727	98,653	2,778,367	5,113,456	1,365,721	741,034	554,274
New York Connecting.....Jan.	21	208,961	.....	217,050	15,047	10,248	.....	34,214	60,805	113,612	124,476	160,805
New York, Ontario & Western.....Jan.	576	402,253	4,408	449,031	50,217	94,141	15,336	259,249	440,082	-38,223	-59,425	-11,226

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March 16, 1940

